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Functional Testing and Training—
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Functional Testing and Training:

Physical Therapy Aspects

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Functional testing and training has become an important part of physical medicine in the care of neuromuscular diseases. While this discussion will outline a program specifically for the after-effects of acute anterior poliomyelitis, these same tests and the activities designed to assist the poliomyelitis patient pass each test can be applied to patients with many other neuromuscular diseases.

Adequate treatment of poliomyelitis demands the achievement of two separate and distinct objectives. In the acute phase of the disease, the one objective is to save the patient's life. It is only after the patient's life is saved that we can begin a program to achieve the second objective of restoring the highest possible functional capacity within the limits determined by the site and the extent of the original central nervous system damage. The over-all program to achieve these two basic objectives has been described elsewhere by one of us[1] and will not be discussed in detail here. However, it is outlined in Figure 1 to show the relative position of functional testing and training in the over-all program. Obviously, no form of functional training or testing is given in the acute stage, represented by step one; nor in the second step where every effort is made to prepare the patient for motion; nor in the third step where every effort is made to restore coordination and strength by meticulous muscle reeducation. In the fourth step, however, functional testing determines the need for, and the type of, functional activities. It is in this step that specific functional training is employed to teach handicapped individuals to work and live effectively with normal individuals in a normal environment.

There is definite danger in beginning a program of functional training too early chronologically in the over-all program. For this reason, the attempt is made to list activities in the chronological sequence of treatment. To do this, it was found necessary to divide the patients into four great groups determined by the involvement of the muscles necessary to carry out functional activities.

The first group are those with mild involvement, where all important muscles are of "good plus" to "normal" strength. The second group are moderately involved, with all important muscles ranging between strengths of "fair plus" to and including "good." The third group are those who are severely involved, with important muscle groups ranging between strengths of "poor" through "fair." Finally, the fourth group are those individuals who are very severely involved, with important muscle groups ranging between "zero" and "poor minus."

This chronological sequence is outlined in Figure 2 and is meant to emphasize the proper timing of functional training (remedial activity). It is noted that the mild cases need no specific functional training. In the moderate cases, it usually is possible to

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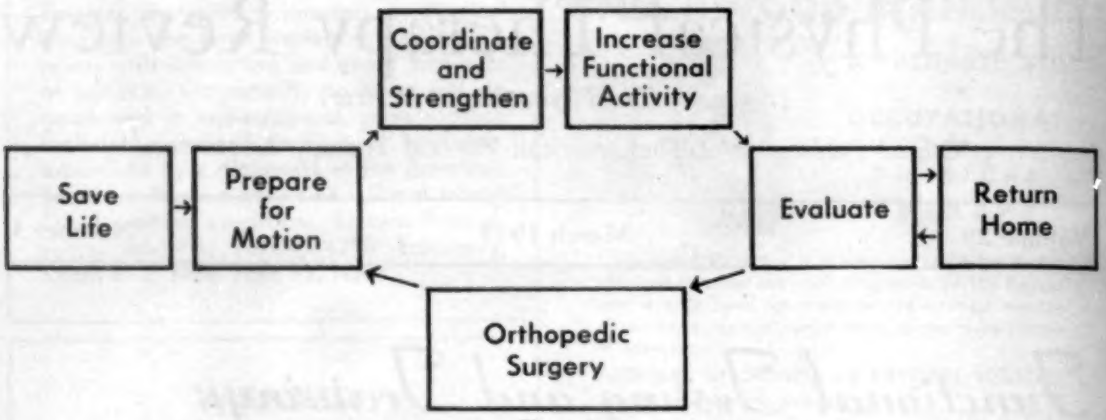

Figure 1.

begin a definite program of functional training (remedial activity) along with restricted normal activity during the second three months of treatment. In the severely involved individuals, functional retraining usually can be initiated after the first six months. This is true also of the patient who is very severely involved, but it should be emphasized that, in those patients with severe or very severe involvement, meticulous muscle reeducation must be continued in conjunction with this specific functional training.

It should be noted in Figure 2 that the first two weeks of all degrees of involvement, from mild to very severe, require the same type of treatment. During these two weeks, there may be progressive nerve

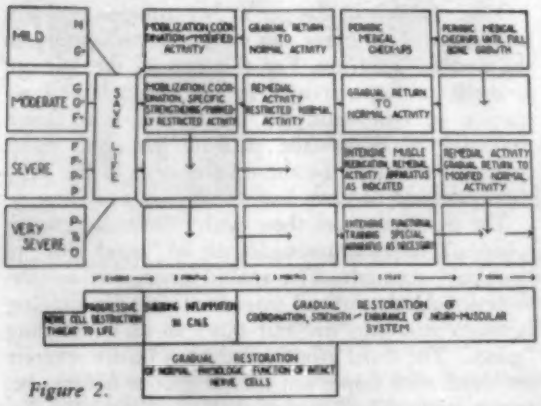

Figure 2.

cell destruction that constitutes a constant threat to life, and the extent of involvement can progress rapidly at any time during this period. The physician must be constantly on the alert to pick up very early evidences of emergencies that might endanger the patient's life. No form of convalescent care must in any way interfere with this basic medical and nursing care.

During the first three months after onset, the inflammation in the central nervous system gradually subsides, and, even though the patient has a very mild residual weakness, a modified program of activity must be enforced as long as any residual inflammation in the central nervous system exists. At some time during the first six months after onset, the anatomical pattern of remaining neuromuscular units is complete, and there is a gradual restoration of normal physiologic function in the anatomically intact neuromuscular units. During this period and continuing for many years, there is a gradual restoration of coordination, strength and endurance of the neuromuscular system which is directly related to the treatment program. Any attempt to speed up this natural sequence of recovery in the central nervous system can result only in incomplete achievement of the second objective to restore the highest possible functional capacity within the limits determined by the extent and site of central nervous system damage.

Functional Testing

Functional training can be considered only after physical therapists and occupational therapists have properly prepared the patient for movement and established coordination and strength in the existing neuromuscular systems. In general, it can be stated that no form of intensive remedial activity should be started until after restoration of normal physiologic function in the anatomically intact neuromuscular unit. This means that, except in the mild and moderately involved cases, no general bodily activity of any intensity should be started until after the first six months, during which time we believe that all the inflammation subsides in the central nervous system, and anatomically intact neuromuscular units then become physiologically available for use.

A functional test is an evaluation of the patient's ability to overcome the physical obstacles encountered in a normal environment. It should be obvious that before specific programs of functional training can be prescribed, an accurate and complete test of the patient's functional capacity must be done. This functional test is in many ways comparable to the well-known muscle strength test. The muscle strength test indicates the ability of an individual muscle or group of muscles to move the segment that it normally controls against known resistance. It is thus a rating of individual muscle capacity from which an idea can be gained of the patient's over-all capacity to act. A functional test deals specifically with bodily segments employing the use of many muscles working together to achieve certain everyday objectives that are necessary for a patient to live effectively in a normal environment.

Setting up a concise and informative functional test is not a simple job. This present test has evolved from several other tests made up of activities suggested by patients, parents, physicians, nurses, physical and occupational therapists, and many other interested individuals. Each item appearing in the test has been a specific problem toward independency for some patient. The list of items were cut to a minimum, organized, and then used as a test for patients with all types of involvement, then reorganized and more patients tested. In its present form, this test has been used on 331 individual patients for a total of 653 tests. These figures, however, do not include the many hundreds of tests given during the development of this present test.

We believe that with the present test, in conjunction with accurate muscle tests, we have a means of evaluating functional capacity of individual patients, which also

(1) Provides a record.
(2) Provides information valuable in the prognosis of rehabilitation.
(3) Serves as an aid in the planning of such rehabilitation.
(4) Shows progress and justification for continuation of treatment when muscle tests show no further specific improvement.
(5) Demonstrates the value of specific supportive and assistive apparatus, and encourages the further development of new apparatus.
(6) Shows the correlation between muscle grades and functional capacity.
(7) Provides motivation and encouragement for the patient.

It is to be particularly emphasized that in the teaching and the supervision of the activities of the test they become a therapeutic exercise with possibilities of improvement in coordination, strength and endurance. A functional test and certainly functional training must be done only by therapists who have a thorough knowledge of kinesiology and functional anatomy. It was found that all test activities could be divided into eight great groups:

(1) Activities carried out in bed, or by the bed-bound patient.
(2) Activities directly connected with eating.
(3) Activities directly connected with hygiene.
(4) Activities directly connected with dressing.
(5) Activities directly connected with apparatus.
(6) Activities directly connected with use of various utilities.
(7) Activities directly connected with communication.
(8) Activities directly connected with locomotion or ambulation.

The sequence of these general headings is in accordance with the general plan of treatment for convalescent anterior poliomyelitis as carried out at the Georgia Warm Springs Foundation. The usual procedure is for patients to begin activity in bed. Later, when it is safe to increase the patient's activity, he does so in a wheel chair and then finally on the walking court.

Under the eight divisions, there are a total of eighty-six activities. These activities have been kept at a minimum, and each activity is representative of many basically similar activities. The list of activities on the Functional Evaluation Chart devised at Georgia Warm Springs Foundation is given in Table 1.

As part of the development of the testing system, it became important to devise a system of grading. The present system of grading is based on independency and not necessarily normalcy. A great many cases of poliomyelitis never can be considered normal, and yet it is possible for them to attain complete independency. The same basic symbols are used in the functional test as are used in the muscle test employed at the Georgia Warm Springs Foundation. There are, however, certain additions and modifications as explained below.

EXPLANATION OF GRADING SYMBOLS— FUNCTIONAL TEST

Grades Indicating Independence

N Normal Performance — patient apparently uninvolved.

Example of grade "N"
Testing: Get in and out of chairs

Table 1

BED
Operate signal light
Hold letter
Hold book
Turn pages
Write name
Operate bed lamp and radio
Procure object from night table
Sit up
Turn over

EATING
Eat with fingers
Eat with fork
Eat with spoon
Drink from glass
Drink from cup
Cut with knife and fork

HYGIENE
Use handkerchief
Wash hands
Wash face
Brush teeth
Comb hair
Clean nails
Trim nails
Shave or make up
Get on and off toilet
Use toilet paper
Bathe self
Get in and out of bath or shower
Shampoo hair

DRESSING
Put on - remove underclothes
Put on - remove buttoned shirt
Put on - remove slipover garment
Put on - remove slacks
Put on - remove shoes
Put on - remove hose
Tie bow or tie

APPARATUS
Lock and unlock braces
Put on - remove slings
Put on - remove splints
Put on - remove corset
Put on - remove braces

UTILITIES
Operate door bell
Operate flip light
Operate pull light
Operate faucet
Operate hook and eye latch
Operate hasp and padlock
Operate barrel bolt
Operate inside door set
Operate night latch
Operate venetian blind
Plug in cord
Wind watch or clock
Open and close drawers
Open and close windows
Use needle and thread
Use scissors

COMMUNICATION
Write or type test passage
Handle own mail
Handle money
Use dial 'phone
Use pay 'phone
Wrap and unwrap package

LOCOMOTION
Roll wheelchair on smooth surfaces
Roll wheelchair on rough surfaces
Control wheelchair down grade
Roll wheelchair upgrade
Open common doors, go through, and close
Operate automatic elevator
Move on floor not in upright position
Walk on smooth surfaces 100 yds.
Walk through an aisle of seats
Walk on rough surfaces
Walk up and down 20 degree grade
Walk forward and backward carrying object
Cross street with traffic light
Get in and out of wheelchair
Get in and out of chairs
Get in and out of bed
Get in and out of car
Do 7 inch rise steps with rails
Do 7 inch rise steps without rails
Do plane steps
Do bus and train steps
Pick up object from floor
Get down and up from floor
Drive car

SPECIALTIES

Action: Patient can get in and out of all types of chairs in a normal manner.

G+ Excellent performance—involvement apparent but speed, safety, endurance and agility in performance no problem.

Example of grade "G+"
Testing: Get in and out of chairs.
Action: Patient can get in and out of any type of chair gracefully and with safety and speed, but involvement is apparent.

G Adequate performance for all practical purposes.

Example of grade "G"
Testing: Get in and out of chair.
Action: Patient can get in and out of any type of chair but is slow and a little awkward.

G— Adequate performance in a specific environment — limited to special types, styles, weights, heights, etc.

Example of grade "G—"
Testing: Get in and out of chair.
Action: Patient performs activity if seat and arm of chair is certain height from floor.

Grades Below Independence

F Performance possible but not practical (speed, safety, etc.).

Example of grade "F"
Testing: Get in and out of chair.
Action: Patient can accomplish activity but it is not safe for him to do it alone.

P Performance is partial only.

Example of grade "P"
Testing: Get in and out of chair.
Action: Patient can get into chair but cannot get out of it.

? At this stage of treatment patient not allowed to perform the activity.

Example of grade "?"
Testing: Roll wheel chair on smooth surface.
Action: Patient is working for coordination of shoulder muscles, and rolling wheel chair would not be wise until patient is better coordinated.
Testing: Walk on smooth surface 100 yards.
Action: Patient is not ready to start weight bearing.

X Activity not indicated for testing.

Example of grade "X"
Testing: Lock and unlock braces.
Action: Patient does not wear braces.
Testing: Shave or make up.
Action: Patient is a child age seven — activity not indicated.

O Activity impossible.

Examples of grade "O"
Testing: Get in and out of chair.
Action: Patient can not make any effort toward getting in and out of chair.

Small letter beside grade or symbol indicates:

w Possible in wheel chair.

Example grade "Gw"
Testing: Get in and out of chair.
Action: Patient can get in and out of chair only from his wheel chair.

b Possible in bed.

Example grade "Gb"
Testing: Put on — remove slacks.
Action: Patient can put on and remove slacks when in bed.

No small letter = Possible standing.

Example grade "with no small letter G"
Testing: Get in and out of chair.
Action: Patient can get in and out of any type chair from a standing position

Grade with a circle = Assistive, supportive or mechanical apparatus necessary for that grade.

Example grade with a circle "(G)"
Testing: Get in and out of chair
Action: Patient can get in and out of any type chair with apparatus (one long leg brace).

V = Working on improving performance of activity.

Example of grade V "FV"
Testing: Get in and out of chair.
Action: Patient can get in and out of chair, but it is not safe to attempt this alone. Patient and physical therapist are working on improving activity.

Percentage of Independence in Each Section

After the performance of the individual test under the eight large headings have been graded, it then is possible to grade each of the eight main groups by determining the percentage of independent activities under each group.

1. Count number of grades indicated for testing.
2. Count number of independent grades.
3. Divide number of independent grades by the number of grades indicated for testing to obtain the percentage of independence in each section or use percentage chart.

Obviously this is a very gross measurement of accomplishment, but is of some value, not only in showing the patient his improvement but in giving the physician a quick summary of the general potential in each large heading. It should be noted particularly that only those grades indicative of adequate and practical performance are counted in determining the over-all percentage of accomplishment.

By routine order, all functional tests must be repeated every two months just as are the muscle tests. However, in practice, the frequency of testing is much greater. It is wise with some patients to make immediate note of test achievement, perhaps even adding the exact date each test was achieved, and then at monthly intervals complete the over-all test for a survey of status at that time.[1]

FUNCTIONAL TRAINING

Functional training in the program here outlined is the attempt to teach a physically handicapped individual to perform safely and practically the basic physical activities that will be required of him when he returns to normal environment. The various activities of the functional training program are specifically designed, prescribed and used to develop the required strength, endurance and skill necessary to pass the representative tests. This is not meant to be a vocational training program but rather a means of developing the basic physical capacity necessary to live independently in a normal environment. While the greatest emphasis is placed on the physical aspects of this program, it should be obvious that any well-rounded program of this type will assist not only physical adjustment but also the equally important mental and social adjustment that the physically handicapped patient must make.

The goal of this program is independency of action. We strive to attain this independency by normal patterns of motion if at all possible. In many instances, however, the patient will be sufficiently involved that some type of supportive or assistive apparatus will be necessary to enable him to achieve independency of action. It also might be necessary in other individuals to permit and actually encourage and teach these patients to use substitute patterns of motion or trick movements. In addition to these patterns of movement, which under normal conditions would be considered faulty, specially designed assistive apparatus might be necessary, particularly for more effective use of hands and upper extremities.

Before a detailed program of activities designed to assist the patient to pass the individual represen-

tative tests could be set up, an analysis of the bodily motions required to complete each test had to be made. Bodily movements are so complex and varied that a great deal of difficulty was encountered in setting up a representative group sufficiently small in number to allow practical charting and correlation between the basic tests and the basic movements entailed in each test. Finally, it was agreed on the following eighteen basic movements as representative of individual and combined actions of bodily segments.

(1) Fine opposition and/or retraction of finger and/or thumb.
(2) Gross opposition and/or retraction of finger and/or thumb.
(3) Flexion and/or extension of wrist.
(4) Radial and/or ulnar deviation of wrist.
(5) Pronation and/or supination of hand.
(6) Bringing hand toward head and return.
(7) Reaching forward and/or pulling back.
(8) Reaching up and/or pulling down.
(9) Hand(s) pushing forward.
(10) Hand(s) pushing downward.
(11) Moving head backward and/or forward and/or turning sideward.
(12) Sitting and/or standing balance.
(13) Bending trunk forward and/or backward.
(14) Twisting trunk side to side.
(15) Stepping forward and/or backward.
(16) Stepping up and/or down and/or sideward.
(17) Standing on "tip toes".
(18) Flexing and/or extending ankle.

Literally hundreds of activities are available to assist the patient to regain strength, endurance and skill in the basic eighteen movements, and thus assist him eventually to pass the specific functional tests. It is found that these activities fall quite naturally into three distinct programs:

(1) Physical therapy.
(2) Occupational therapy.
(3) Recreational therapy.

Therapists from these three sections of the Department of Physical Medicine were grouped together for the specific purpose of functional training and designated as the "Department of Remedial Activity." The Department of Remedial Activity thus has the specific purpose of first, functional testing; followed by second, functional training, using the combined skills of physical therapy, occupational therapy and recreational therapy.

PHYSICAL THERAPY IN REMEDIAL ACTIVITY

In general, physical therapy has the responsibility of locomotion, including the various mechanical phases, both natural and artificial, that lead to effective locomotion. More specifically, physical therapy has four basic objectives:

(1) To increase or "set" coordinate patterns of gross extremity and trunk movement.
(2) To increase strength and endurance in weight bearing muscle groups, particularly in the trunk and upper extremities when braces and crutches must be used.
(3) To teach effective patterns of motion, both normal and substitute, and/or use of apparatus for safe and practical locomotion.
(4) Maintain or obtain adequate mobility of bodily segments necessary to effective locomotion.

There are seven large groups that make up these exercise activities. They usually are carried out in a rather definite chronological order. However, any one or combination of activities may be carried out at any time as is necessary for the specific problem in the individual patient. Sixty-three activities are listed under these seven headings. Many more are possible.

BED EXERCISES

Depending on the site and extent of muscular weakness, a patient may be able to carry out all of the basic segmental movements without assistance in bed. Many of these movements will be isometric contractions, others will be movements either assisted or resisted by the weight of the segment itself. These exercises must be very carefully taught and initially supervised so that the patient carries out the exercises with the basic coordinate patterns that have been instilled by physical therapy following the onset of illness. It also is possible to institute similar bed exercises with specific resistance utilizing weights and pulleys, bed slings, individual weights, Indian clubs, bar bells, and any other apparatus adaptable to bed routines. Various types of trapeze arrangements can be set up to permit continued strengthening of the upper extremities and trunk and to begin initial movement about the bed. For some patients, it is extremely important to augment manual stretching by the physical therapist. This may be accomplished by teaching certain stretching exercises and positions and using special stretching apparatus that can maintain or assist in obtaining the necessary range of motion for longer periods of time. In addition to exercises for all basic segmental movements with and without resistance, the actual teaching of bed activities listed on the functional test should be carried out.

MAT EXERCISES

The mat provides an ideal place to strengthen muscles necessary for crutch and cane walking; moving from one height to another by upper extremity power; balance; trunk exercises and any locomotion—sitting, kneeling, on "all fours," and standing. Leatherette has proved to be a good sliding surface as well as a washable covering for mats. Arm and trunk exercises in sitting and kneeling positions, as well as on "all fours," require continuous practice. The "ultimate" in balance is to be able to catch the volleyball and basketball thrown from an able bodied person with maximum speed and force and to play sitting or kneeling volleyball with a 75″ circumference plastic ball. Scooting, crawling and walking on hands, forward, backward, sideward, combine balance and strengthening activities. "Sit-ups" and sitting "push-ups," with and without assistance and apparatus, are best done on mats. Prone "push-ups" without braces can be followed with braces to make it even more difficult than a normal "push-up." Trunk exercises must include rolls with hip and shoulder leads. Lying and standing exercises, with short and regular length crutches, are necessary preparation for walking. Klapp creeping often is possible with assistance. The stretching features of this exercise are excellent. Stretch exercises and positions for heel cords, hamstrings and quadriceps have numerous possibilities on the mat. Well-balanced stools of various heights, scooters with crutch handles, balls, sand bags, ropes and certain specific resistance equipment can be used to advantage here. Transferring from wheel chair to mat, learning to pick up an object from the floor, and learning to fall and get up again, are activities on the functional test that require special practice on the mat.

RESISTANCE EXERCISES

While some resistance exercises are carried out in bed, the great bulk of this program is more efficiently conducted in the therapeutic pool, on the treatment plinth, and with DeLorme apparatus or other special resistance apparatus. In the pool, correct positioning offers the resistance of the water, and positioning for particular routines affords strenuous exercise for muscles fixing the body in these positions (example: keeping body afloat and positioned by upper extremities for lower extremity or trunk exercises and vice versa). Special assistive and resistive pool apparatus, chairs, adjustable parallel bars, flutter boards, rubber discs, and rubber bricks of various sizes and weights, balls, and inflated rings used to float a segment assist a physical therapist in making pool treatments interesting and valuable. DeLorme resistance apparatus can be used effectively. Pulleys, weights, wrist rollers, elastic finger exercises, elastic and spring apparatus, inclined boards, dumb bells, Indian clubs, hand grips, rubber balls, tennis balls, sand bags, the shoulder ladder and wheel, and special forearm and hand apparatus have a definite place in resistance equipment for remedial activity. The stationary bicycle with degrees of resistance and range is valuable, as are exercises on the chest weights. An adjustable chinning bar—uprights 38″ apart and adjustable from 3′ to 6′ — provides chinning or "pull-up" apparatus for wheel chair patients. For similar exercises in upright position, 28″ apart is sufficient for the uprights, but they should be adjustable from 3′ to 7½′. When resistance apparatus or exercises are indicated, a competent physical therapist can easily devise them for patients, regardless of involvement.

WHEEL CHAIR ACTIVITIES

Chronologically, these activities also are carried out about the same time as the aforementioned specific resistance exercises and mat exercises. The correct use of the wheel chair as a medium of therapeutic exercise cannot be overestimated. Patients enjoy increasing wheel chair exercises in length and frequency—even to the point of doing them "every hour on the hour." It is common practice to see a pingpong game or bridge game interrupted for ten wheel chair "push-ups." In this position, additional exercises can be done, such as swinging forward and backward. Some patients eventually reach "push-ups" but have enough upper extremity involvement so that wheel chair activities are started in overhead arm slings.[2] These slings provide support for the shoulder in a safe position and bring that segment into a position of function. Adjustable double lapboards, made of ⅜″ plywood and finished with Tropolite, a waterproof acid resistant liquid bakelite, complete the arm sling apparatus. Specific exercises and activities are taught and supervised until the patient can safely continue them alone. He then spends approximately four hours a day in this apparatus. Wheel chair activities also may include special exercises for lower extremities. Wheeling a chair correctly often is a method of increasing strength and endurance as well as continued use of wheel chair activities on the functional test—once they are mastered.

SHORT PARALLEL BAR EXERCISES

These bars are adjustable between 6″ and 9″. They are 23″ wide and 7′ long. They are mounted on ¾″ plywood that is varnished and waxed, making an excellent sliding surface for certain leg exer-

cises. The two bars can be used as balance beams for walking balance when indicated for a patient. The short parallel bars were initially intended for patients with short upper extremities, in order to make sitting "push-ups" possible. They have, however, proved valuable in providing variety for all patients. Severely involved patients may use this apparatus (with one end on a simple saw-horse) as a means of sliding from wheel chair to mat and vice versa. Sitting balance exercises and trunk balance work can be done here. Sitting "push-ups" at various heights are possible plus exercises in that position, as well as scooting and walking on hands in the sitting position. This piece of apparatus can be turned on side easily for storage or left against a wall when not in use, saving floor space for other activities.

SHORT CRUTCH EXERCISES

With these activities, we begin the actual use of crutches to develop the balance that is required in crutch walking and the musculature of this activity. We use short Everett type crutches more than the axillary type. They are made of extruded aluminum molding—principally 17S-T and 24S-T. The handpiece and two arm bands are covered or lined with leather. These are adjustable from just below handpiece to floor by ¼″ round aluminum rods from 1″ to 15″ in height. Rubber crutch tips are placed on the rods to prevent slipping and protect the mat also.

Sitting "push-ups" with short crutches require considerable balance. After mastering this, crutch balance exercises are started. Scooting and crawling forward, backward and sideward with short crutches are preliminaries to actually stepping forward, backward and sideward. Pushing up to a knee position with crutches and exercises in this position contribute toward independency in getting up from floor with bilateral long leg braces and crutches. We use short and knee length crutches previous to regular long crutches. Exercises on this apparatus are quite strenuous, and care must be taken not to go faster than the patient's endurance permits.

HIGH PARALLEL BAR EXERCISES

These exercises are begun as soon as standing is safe and/or the patient receives his braces. Standing balance is more easily mastered after good sitting and kneeling balance is accomplished. The standing balance exercises range from assistance to resistance. Standing with hands in pocket, lighting a cigarette, applying lipstick, ball games, and "peas porridge hot" are the tests for real standing balance. "Push-ups," with the bars at various levels, are quite a challenge. Bars should be at least 18″ wide and adjustable between 2¾′ and 5½′. These will come to the armpits of a very tall individual. A "push-up" from bars at armpits requires better than normal upper extremities, but above-normal uppers help to compensate for weakness of trunk and lower extremities. Special exercises in the "push-up" position increase strength and endurance. Alternate hiking, stepping in all directions, and swinging forward and backward are regular routines. Four foot square stools ranging in height from 3″ to 6″ are used with bars to assist patients in getting the feel of stepping or swinging up or down steps—with the security of the bars before using crutches. Codman exercises are possible for upper extremities, with or without support of the bars. Stretching hip flexors, hamstrings and heel cords is easily accomplished by the patient himself between the bars. Patients usually spend several short periods of time daily on adjustable parallel bar exercises.

Other physical therapy apparatus specifically used in functional training includes a 4″, 5″, 6″, and 7″ flight of stairs with rails, two 8″ curbs on either side of a large walking court, and two sets of steps approximating airplane, train and bus entrances. One 20 degree concrete elevation, movie aisle of seats, automatic elevator, various types of chairs, a bed of adjustable height, telephones, tubs, showers, toilets and other properties necessary for functional training are available. A functional testing board saves time in testing inasmuch as a number of activities are incorporated on the one board. The Remedial Activity Department has a special wheel chair with removable arms and back which is used for functional training and in determining the type chair that will enable the patient to be most independent.

This is only a brief outline of the physical therapy activities in Remedial Activity. The possibilities are many, depending only on the ingenuity of the physical therapist treating the patient. Many phases of these routines make it possible and highly desirable for patients to work together in mat work, parallel bar, short crutch, short parallel bar, and wheel chair exercises. They teach each other, learn from one another, compete among themselves, create game situations themselves, and thoroughly enjoy working toward independency together.

OCCUPATIONAL THERAPY IN REMEDIAL ACTIVITY

The details of occupational therapy in remedial activity have been taken up in another publication[3] and will be only briefly outlined here. This program includes manual arts therapy. In general, occupational therapy is responsible for the development of the finer skilled movements of the hand, the correlation of these movements with adequate trunk

balance in the standing and sitting position, and the further development of endurance and coordination in the shoulder groups. We have divided the activities of occupational therapy into eight great groups: art, clay, leather, metal, plastic, wood, needlecraft, printing, typing and weaving. In addition, there is a ninth miscellaneous group that includes such items as fly-tying, knotting, paper craft, repair work as of clocks and radios. It will be seen that seventy-five individual occupational and manual arts activities are listed under the nine great groups. There are, of course, a great many variations of each activity so that actually many hundred individual activities are available to the patient and can be planned to suit almost any pattern of strength and weakness and almost any age group.

Recreational Therapy in Remedial Activity

The details of recreational therapy in remedial activity will not be discussed here, because they will appear in a separate publication.[4] In brief outline, however, there are ten large groupings of activity within the recreational therapy program. These are ball games, card games, dramatics, outdoor games, paper and pencil activities, puzzles and tricks, photography, rhythmical and musical activities, swimming, table and board games. In addition, there is an eleventh miscellaneous group. There are ninety individual activities listed under the eleven great groups. Again the variations are so numerous that a broad recreational therapy program can be planned for all age groups with almost any combination of muscle weakness. It is important to note that recreation can be a therapeutic measure to specifically increase coordination, strength and endurance of weakened bodily segments. Recreation also is used to obtain what might be called social rehabilitation along with the purely physical aspects of rehabilitation. Through intelligent recreational therapy, we attempt to restore the patient's spirit of cooperation and/or competition, develop a spirit of sportsmanship, minimize the patient's consciousness of physical handicaps and the apparatus he must use.

Conclusion

It has been the purpose of this presentation to indicate the need for and the place of functional testing and training in an over-all convalescent poliomyelitis program. Particular emphasis has been placed on the proper timing of functional training because it is felt that the greatest danger of such a program would be the initiation of functional activity before the patient was properly prepared for these activities by sound and thorough muscle reeducation.

The functional test has been set up to adjudge the individual patient's ability to return to a normal environment and carry out certain basic procedures with complete independence. This present test has been used on only 331 individual patients for a total of 653 tests. Further use will no doubt bring out certain faults, and we hope also valuable additions.

The functional training program is a logical extension of a program based on proven methods of muscle reeducation and is a correlation of the skills and experiences of physical therapy, occupational therapy and recreational therapy. The physical therapy aspects of this training program were discussed in some detail.

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The Physiology and Pharmacology of the *Peripheral Circulation*

David I. Abramson, M.D., F.A.C.P.

In recent years interest has been revived in the vascular responses of blood vessels of the extremities in both normal and pathologic states. This is due largely to the fact that with the adoption of various modifications, the venous occlusion plethysmographic method has been developed to the point where accurate and reproducible data can be obtained in man. Through the use of the segment type of plethysmograph[1], a part of the extremity can be studied separately and independently of adjoining portions, and, as a result, it has been found that in many respects the physiologic and pharmacologic responses of the blood vessels in the distal parts of the limbs (the hand and foot) are different from those observed in the proximal portions (the forearm and leg).

No attempt will be made to present the technical aspects associated with the study of peripheral vascular responses and the determination of the rate of blood flow, but a brief discussion of the principles involved will be of advantage for a better understanding of the material which is to be considered.

The method has its origin in the work of Brodie and Russell[2], who in 1905 studied renal blood flow in animals. They placed the intact kidney in a metal container which covered the entire organ except the point at which the renal vessels and the ureter entered. The rate of blood flow was determined by temporarily clamping the renal vein and recording on a kymograph the resulting increase in kidney volume. Hewlett and van Zwaluwenburg[3] subsequently utilized this principle to study blood flow in the extremities of man.

The procedure consists of placing a portion of the limb—the hand, the forearm, the leg or the foot—into an insulated metal cylinder (Fig. 1) and making watertight the openings of the machine through which the extremity passes. This is accomplished by the use of rubber diaphragms which are attached to rubber cuffs. The cuffs are fastened to the skin of the extremity, at the point of entrance into and exit from the machine, by paper cement. The rubber diaphragms then are pulled tightly over the outer edges of the machine and held in place with metal rings (Fig. 2). In this fashion a watertight compartment is produced which contains the portion of the limb under study. The apparatus is filled with water at a specified temperature, and this level is maintained during the entire experiment by means of a heating unit and fan in the interior of the machine (Fig. 1). The apparatus is then connected to some type of volume recorder which writes on a kymograph drum.

When the rate of blood flow is desired, a narrow blood pressure cuff is placed around the extremity just proximal to its entrance in the machine (Fig. 2), and this is connected with a pressure system which, when required, will allow a pressure of 50-70 mm. Hg. to enter the cuff instantaneously. Provided the blood pressure of the subject is not abnormally low, this height of pressure is insufficient to interfere materially with blood flowing into the limb as a result of cardiac contraction. However, it will, at least initially, prevent all blood from flowing out, since it is much higher than the pressure in the large veins of the limb. Consequently, blood will pile up in the portion of the extremity in the machine, increasing its volume. This will cause an equivalent displacement of water out of the machine, which will be reflected in a rise of the baseline on the drum (Fig 3). The rate at which the baseline ascends depends upon the rate at which the blood enters the limb to distend it. In other words, the slope of the rising baseline (Fig. 3) can be utilized to determine the rate of blood flow into the limb. This eventually is calculated as the number of cc. of blood entering the

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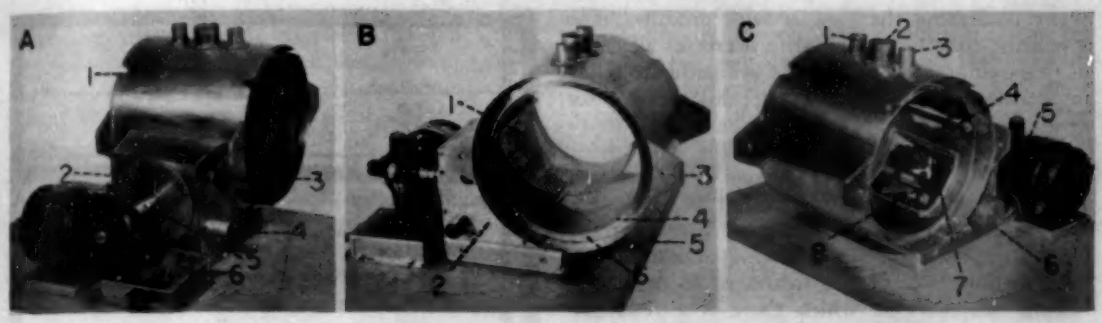

Figure 1. A—Side view of plethysmograph. B—Anteroposterior view. C—Oblique view, showing heating unit (8) and fan (7). (From E. B. Ferris, Jr., and D. I. Abramson: Description of a New Plethysmograph. Amer. Heart J., 19:233, 1940.)

portion of limb per minute per 100 cc. of tissue for the specified temperature of water in the plethysmograph and for the given environmental temperature.

Before discussing the vascular changes observed in the peripheral blood vessels under different physiologic and pharmacologic conditions, let us consider some general statements concerning the nervous control of the circulation.

Normally all components of the peripheral vascular system, the main arteries and their branches, the arterioles, the capillaries, the arteriovenous anastomoses and the veins, are in a state of partial contraction called tonus. In certain vascular sites this is dependent upon the integrity of the sympathetic nervous system. The center controlling vascular tonus, the vasomotor center, is located in the medulla; and it exerts its effect by way of sympathetic nerves, which run in the intermediolateral column of the spinal cord, leaving it in the thoracic and lumbar levels. These sympathetic nerves (preganglionic fibers) then end in collections of nerve cells on either side of the spinal column, the paravertebral sympathetic nerve ganglia. From the latter arise other fibers (postganglionic fibers) which enter the mixed peripheral nerves and in this way are segmentally distributed to the peripheral vessels. An increase in vasomotor tonus causes further contraction of the blood vessels and hence a reduction in peripheral blood flow. Decreasing or totally removing vasomotor tonus will result in an increase in circulation, since now the vessels will dilate passively once the control of the sympathetic nervous system is removed. Whether or not there are vasodilator nerve fibers in the sympathetic nervous system which produce active vasodilatation of the vessels has not been settled with regard to man. In most animals there is no question that such fibers exist.

Vasomotor tonus can be abolished entirely by destroying the integrity of the pathway over which the vasoconstrictor impulses pass. For example, sympathectomy produces this permanently through the removal of the paravertebral ganglia or by section of the preganglionic fibers as they leave the cord. Paravertebral block produces this temporar-

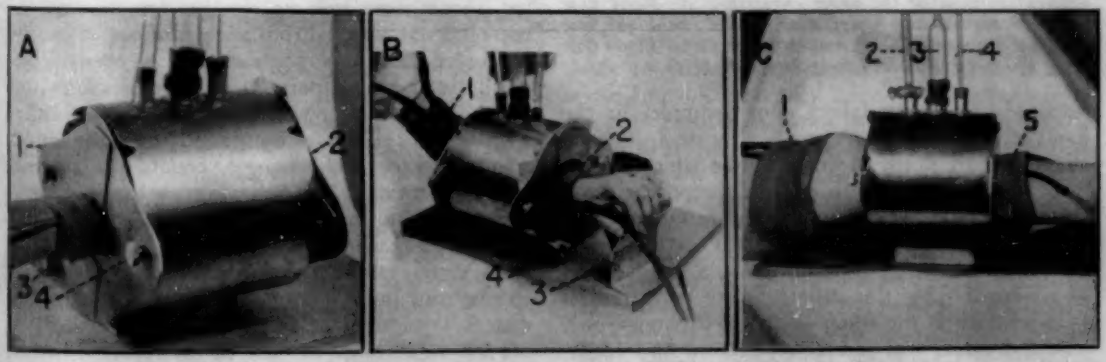

Figure 2. A—Apparatus used as hand plethysmograph, showing narrow blood pressure cuff around the wrist used to provide a venous occlusion pressure. B—Apparatus used as forearm plethysmograph. C—Apparatus used as a leg plethysmograph. (From E. B. Ferris, Jr., and D. I. Abramson: Description of a New Plethysmograph. Amer. Heart J., 19:233, 1940.)

ily by paralyzing the ganglia with procaine. The new drug, Etamon, temporarily paralyzes all ganglia, parasympathetic as well as sympathetic, while another new drug, Dibenamine, removes vasomotor tonus probably by paralyzing the neuroeffector organs, i.e., the junctions between the sympathetic nerve ending and the wall of the vessel itself. It is clear, therefore, that by removal of vasomotor tonus a clinical means is at hand for materially increasing peripheral blood flow. Such a procedure has a definite role in the treatment of peripheral vascular disorders in which there is a reduction in circulation to the extremities as a result of excessive vasospasm.

It must be pointed out that although the vasomotor center is the site of origin of vasoconstrictor impulses and hence directly responsible for the maintenance of vascular tonus, it, in turn, is influenced by many conditions, such as hormonal action, various physiologic body functions, emotions and such external stimuli as warmth, cold and noxious agents. The state of vascular tonus, therefore, is the resultant of the interaction and integration of a great many different factors.

If the volume of the limb is studied, using the venous occlusion plethysmograph, considerable information can be obtained concerning the vascular

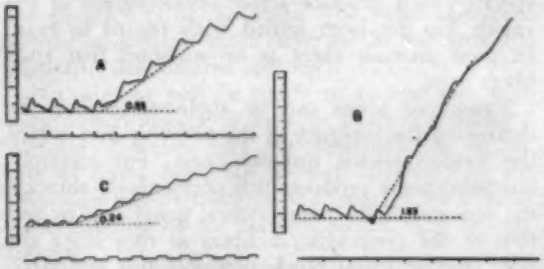

Figure 3. Examples of blood flow curves obtained from different portions of the upper extremities. A—Blood flow curve for hand at bath temperature of 32 C. B—Blood flow curve for hand at bath temperature at 45 C. C—Blood flow curve for forearm at bath temperature of 32 C.

responses at the periphery. For example, in the hand and, to a lesser degree, in the foot, marked alterations are noted in limb volume which appear to be spontaneous in nature since they occur without the provocation of any given stimulus. These changes are clearly observed in Figure 4. The graphs represent the volume changes in the hand of a normal subject at different bath temperatures (temperature of the water in the plethysmograph). The individual was completely relaxed and apparently not being affected by external stimuli. With the bath temperature at 32 C., as noted in "B", marked variations in limb volume can be seen;

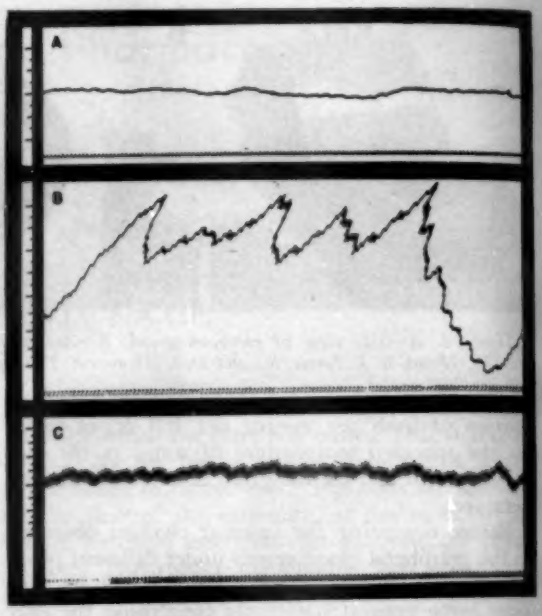

Figure 4. Effects of various bath temperatures upon magnitude of spontaneous variations in hand. A—19 C. B—32 C. C—45 C. (From D. I. Abramson and K. H. Katzenstein, Spontaneous Volume Changes in the Extremities. Amer. Heart J., 21:191, 1941.)

superimposed upon these are the much smaller volume changes produced by each cardiac systole. The same hand subjected to a bath temperature of 19 C., as depicted in "A", reveals very little if any variations in limb volume. A similar type of response is noted in "C", with the hand exposed to a bath temperature of 45 C. It would seem then that spontaneous limb volume changes are obtained in the hand only when the vessels are not excessively constricted or dilated. Similar findings are noted in the foot. However, in the forearm and leg, spontaneous volume changes are minimal or not observed at all. From such findings it can be concluded that this phenomenon is present primarily in the distal portions of the extremities and only to a slight degree in the proximal portions.

In the elucidation of the underlying mechanisms responsible for such changes, certain experiments can be mentioned. By applying an external pressure of 60-70 mm. Hg. to the wrist and thus eventually raising the pressure in the lumen of the veins distal to the constriction to this level, the spontaneous limb volume changes in the hand are materially reduced or abolished entirely. This finding has significance in view of the report of Lewis[4] and others that experimentally raising the pressure within the lumen of the veins to 60-80 mm. Hg. prevents venous constriction in great part,

without materially affecting arterial inflow. Furthermore, removal of the control of the sympathetic nervous system over the peripheral blood vessels, as by sympathectomy, causes the complete abolishment of spontaneous limb volume changes in the hand and foot.

It would seem then that under physiologic conditions the distal portions of the extremities are intermittently changing in volume, largely as a result of alterations in the quantity of blood present in the veins, venules and capillaries. Furthermore, the capacity of this vascular bed is dependent in great part upon changes in venous tonus. The integrity of the sympathetic nervous system evidently is essential for the production of these volume changes, since the alterations are most commonly seen in sites in which the vessels are under marked vasomotor control, the hand and foot, and in environmental conditions which are in the range of vasomotor regulation of body temperature. Moreover, postganglionic sympathetic section abolishes the spontaneous volume changes.

With the use of the segment plethysmograph, it also has been found that the resting circulation is different in various portions of the extremities. For example, under physiologic conditions, i.e., room temperature of 25 C. and bath temperature of 32 C., the blood flow in the hand varies around 10 cc. per min. per 100 cc. limb volume, while in the forearm it is approximately 1.8 cc., in the leg, 1.4 cc., and in the foot, 2 cc. Obviously the rapid circulation in the hand, as compared with the other portions of the extremities, is not due to a much higher metabolism of the tissues of which it is made. For, it is composed of skin for the most part, if one disregards such relatively avascular tissues as bone, tendons and fat, while the forearm and leg are made up primarily of muscle; it is generally considered that the metabolic needs of muscle are greater than those of skin. Therefore there must be some other reason for the high resting blood flow in the hand. It has been proved that this large quantity of blood flowing through the vessels of the hand has the dual function of first bringing nutrition to the tissues and secondly, of greater importance, of losing heat from the body to the environment. This function of heat dissipation has been linked with the anatomic findings of arteriovenous anastomoses in the fingertips and in the toes and their relative absence in the skin of other portions of the extremities. These shunts are small muscular vessels which connect the small arteries or arterioles with venous channels, thus short-circuiting the blood away from the capillaries directly into superficial veins. In this manner the venous system can be flooded with blood, and large quantities of heat can be lost from it as the blood travels through the extensive superficial venous network in the skin and subcutaneous tissues of the hand and forearm. In a cold environment, arteriovenous shunts also play an important role. When the temperature drops near freezing, there is an intermittent flow through these structures which helps maintain the viability of the skin.

Local blood flow can be increased by the use of heat applied either directly to the extremity or to distant parts of the body to produce indirect vasodilatation. Heat is a potent vasodilating agent. If the hand, for example, is exposed to a bath temperature of 45 C., the local blood flow will rise from 10 cc. per min. per 100 cc. limb volume to as much as 35 cc. This is due to the direct effect of heat primarily on the cutaneous vessels. The response in the forearm and leg to this stimulus is not as great. It is important to keep in mind, however, that at the same time that heat increases the local circulation, it also has a marked effect on raising the metabolic needs of the tissues. It cannot, therefore, be considered a worthwhile therapeutic agent for the improvement of the circulatory status of a limb when directly applied. Generally the augmented blood flow in great part, if not completely, is neutralized by the elevated metabolic requirements of the tissues. Furthermore, in the presence of an impaired local circulation, its use is fraught with danger and hence invariably contraindicated. Ordinarily when heat is applied to a normal limb the skin is not exposed to the full effect of the stimulus since the blood circulating through the extremity is continuously cooling it. However, if there is an impairment in blood supply, then this cooling mechanism is reduced or lost and as a result poorly nourished or almost devitalized tissues are subjected to the full effect of the heat. This not infrequently is followed by the production of a burn, resulting in gangrene and in many instances necessitating amputation.

Application of heat to distant portions of the body to produce an increase in blood flow in an extremity, on the other hand, is a completely innocuous procedure. Since the involved limb is not exposed to the heat there is no coincident increase in metabolic requirements of its tissues. The augmentation in local circulation is brought about as follows: When heat, in the form of hot water bags, heating pads or diathermy, is applied to the trunk and the normal extremities, the blood circulating through these portions of the body is likewise heated; eventually the temperature of the entire circulating blood is raised. As this heated blood passes through the temperature regulating centers in the hypothalamus and elsewhere these centers are stim-

ulated. Impulses are then initiated which reach the vasomotor center in the medulla inhibiting it. Consequently with fewer vasoconstricting impulses being formed and reaching the periphery, the blood vessels in the involved extremities passively dilate, thus allowing a greater amount of blood to reach the tissues per unit of time. This type of change occurs only in those vascular beds normally under the control of the vasomotor center. Hence the increase in blood flow which follows moderate body heating is observed in the hand and foot and not in the forearm and leg.

Differences in the reactions of the blood vessels in the proximal as compared with the distal portions of the extremities also have been brought out by the use of various chemical stimuli. For example, Grant and Pearson[5] and Kunkel and his associates[6] have shown that both a dilute and a concentrated solution of epinephrine injected intravenously in human subjects will produce a decreased blood flow in the hand, probably due to vasoconstriction of the arterioles and arteriovenous shunts, while at the same time there actually is an increase in circulation in the forearm. This latter effect is most likely dependent upon a passive dilatation of the vessels in the muscles following the increase in cardiac output which ensues. Similarly we[7] have observed that smoking causes a significant decrease in blood flow in the hand and no change in the forearm. Alcohol by mouth produces a significant increase in blood flow in the hand and foot and little or no change in the forearm and leg[8]. This effect probably is due to inhibition of vasomotor tonus of the vessels in the distal portions of the extremities. The effect of smoking in the hand is not noted after sympathetic control of the blood vessels is removed.

Again the use of various types of physical stimuli has brought out a significant difference between the reactions of the blood vessels in the different sites. We[9] have found that the application of a noxious stimulus, such as a pinch, produces no alteration in arterial blood flow in the forearm while in the hand there is a marked decrease. A mental problem in arithmetic, like multiplying three figures by two or three figures, without the use of paper and pencil, and hyperventilation will produce a decrease in blood flow in the hand and foot and an actual increase in flow in the forearm. At the same time there is an augmentation in pulse rate and blood pressure in both cases. General anoxia, produced by inhaling a 10 per cent oxygen mixture, uniformly produces a decrease in blood flow in the hand while in the forearm and leg a definite increase is observed. The inhalation of a 7 per cent carbon dioxide mixture always will produce a decrease in blood flow in the hand, but the change in the forearm and leg is variable. Generally when no alteration in blood pressure is observed there is likewise no change in circulation through these latter blood beds, but if a rise in systemic blood pressure occurs then the blood flow also is increased.

From all this evidence it can be concluded that vascular responses in the distal portions of the extremities, i.e., the hand and foot, are largely dependent upon the integrity of the sympathetic nervous system which exerts a vasoconstricting effect upon the arterioles, the arteriovenous shunts and the venules and veins. It is possible that the presence of arteriovenous shunts in the distal parts of the limbs and their absence in the proximal parts is bound up with the findings that the rate of blood flow in the hand and foot is changed readily by vasoconstricting stimuli while a similar response is not obtained elsewhere.

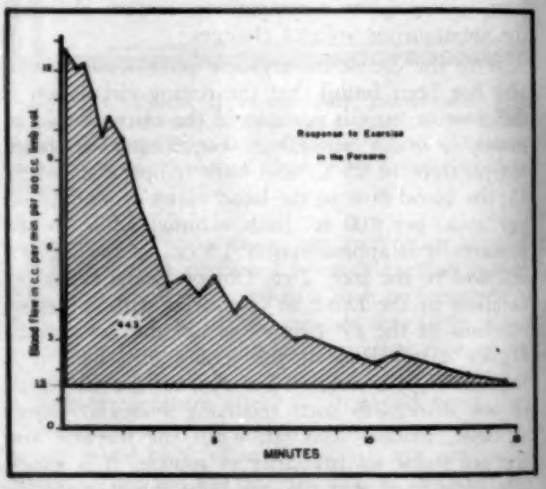

Figure 5. Effect of exercise on blood flow in the forearm. The lined portion of the graph indicates the total excess blood flow in the postexercise period, over and beyond the resting flow. This represents the part of the blood flow debt, consequent to the work, which was not repaid during the actual exercise.

The sympathetic nervous system has much less influence upon the blood vessels in the proximal portions of the extremities, with the control that does exist being limited to the cutaneous blood vessels. There is little evidence to indicate that stimulation or section of sympathetic vasoconstrictor nerves produces any change in the rate of blood flow through the voluntary muscles of the forearm and leg. These physiologic differences should be kept in mind when evaluating the therapeutic effects of sympathectomy in the treatment of peripheral vascular disorders.

It would appear then that the circulation in the forearm and leg, for the most part, is unaffected by stimuli which do not have a systemic cardiovascular effect and is enhanced by those which appear to increase the minute volume output of the heart. However, the most effective stimulus for augmenting blood flow through these vascular beds is a greater need locally for oxygen and nutrition. For example, when the forearm is exercised, there is an immediate marked vasodilatation of the blood vessels in the muscles to take care of the greatly increased metabolic needs of this tissue. Generally, despite the various circulatory readjustments, there is still a discrepancy between the requirements of the muscles and the amount of blood brought to them. As a result the tissues incur a blood flow debt which is repaid after the termination of the exercise (Fig. 5). The extent of the repayment and its duration into the postexercise period will depend upon the severity of the exercise, the state of physical fitness of the individual, and the ability of the blood vessels to dilate to the stimulus of local oxygen needs. Obviously in the patient with occlusive arterial vascular disease, in whom the vessels are partially occluded and unable to dilate readily, the postexercise blood flow debt will be repaid slowly.

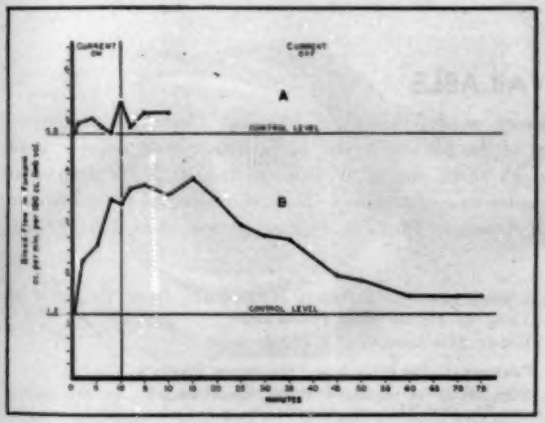

Figure 6. Effect of varying the bath temperature upon the blood flow response to a 10 minute period of mecholyl by ion transfer. A—Bath temperature of 45 C.; control flow in forearm, 4.8 cc. per minute per 100 cc. limb volume. After ion transfer, little change in blood flow produced under these conditions. B—Bath temperature of 32 C.; control flow in same forearm, 1.2 cc. After ion transfer, marked increased in blood flow produced. (From D. I. Abramson, S. M. Fierst and K. Flachs: Evaluation of Local Vasodilator Effects of Acetyl-beta-methylcholine chloride (mecholyl) by Iontophoresis. Amer. Heart J., 23:817, 1942.)

Some of the pharmacologic responses of the peripheral blood vessels have already been discussed, such as the vasoconstricting effect of epinephrine on the cutaneous vessels of the hands and feet and its vasodilating effect on the muscle blood vessels of the forearm and leg, the vasoconstricting effect of the inhalation of carbon dioxide and smoking on the vessels of the hand, and the vasodilating response that follows the ingestion of alcohol.

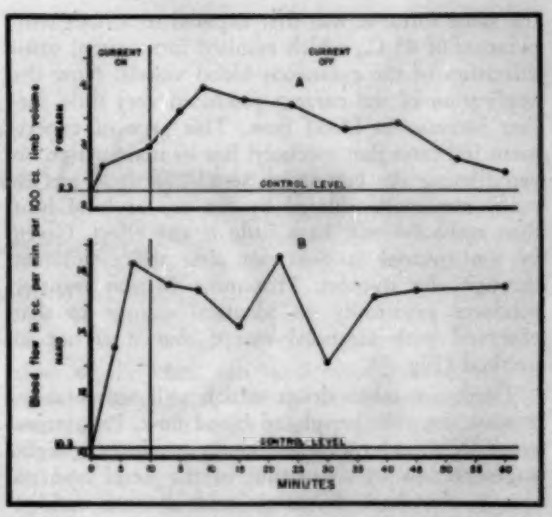

Figure 7. Effect of a 10 minute period of histamine by ion transfer (current density 10 milliamperes). Significant increase in blood flow is produced in forearm and hand during and after application of the current.

Now let us consider the changes in blood flow produced by ion transfer. Figure 6 demonstrates the alterations in circulation produced in the forearm with mecholyl, utilizing this procedure[10]. In "B", with the limb exposed to a bath temperature of 32 C. a definite increase in flow was observed during the period of application of the current, and this continued for 65 minutes afterward. The current density used was 15 milliamperes. In "A"

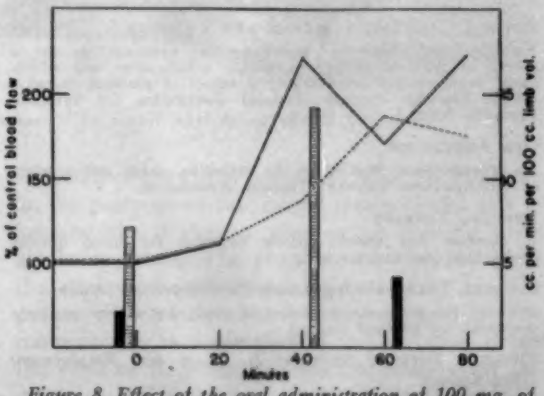

Figure 8. Effect of the oral administration of 100 mg. of nicotinic acid upon blood flow in hand (solid line) and forearm (dotted line). (From D. I. Abramson, K. H. Katzenstein and F. A. Senior: Effect of Nicotinic Acid on Peripheral Blood Flow in Man. Amer. J. Med. Sci., 200:96, 1940.)

the same forearm was first exposed to a bath temperature of 45 C., which resulted in maximal vasodilatation of the cutaneous blood vessels. Now the application of the current produced very little further increase in blood flow. This type of experiment indicates that mecholyl has its main action on vasodilating the cutaneous vessels. If these are already maximally dilated by the use of local heat then mecholyl will have little if any effect. Given by ion transfer it does not alter the circulation through the muscles. Histamine by ion transfer produces practically an identical change to that observed with mecholyl except that it is not so marked (Fig. 7).

There are other drugs which will temporarily, at least, increase peripheral blood flow. Papaverine given by mouth or intravenously produces a slight augmentation in circulation in the hand and no change elsewhere. Nicotinic acid elicits a definite increase in both the hand and forearm (Fig. 8) and minimal changes in the leg. Prostigmine causes some augmentation in circulation in the hand. There are a number of other drugs which have been investigated using the venous occlusion plethysmographic method, but since they have no practical clinical application they will not be discussed at this time.

In summary it would appear that very few of the vasodilating drugs are effective in increasing the circulation through the muscles of the forearm or leg. If they have any action this is limited to the cutaneous vessels, primarily of the hand and foot, and to a lesser extent of the forearm and leg.

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REPRINTS AVAILABLE

One free copy of each scientific reprint (except the History of the American Physical Therapy Association, and the Anterior Poliomyelitis and Cerebral Palsy Issues of the REVIEW will be provided upon request to all members, students in the approved schools and libraries. A small charge is made as indicated for additional copies to members, students and libraries, and for all copies to nonmembers. The informational brochures are available to all without charge. To obtain reprints write: American Physical Therapy Association, 1790 Broadway, New York 19, N. Y.

PHYSICAL THERAPY, A SERVICE AND A CAREER
An illustrated brochure, describing the opportunities for a career in physical therapy, available scholarships and educational requirements for entering a school of physical therapy. (Made available through National Foundation for Infantile Paralysis funds.)

OUR ASSOCIATION
An informational booklet on the activities, scope and services of the American Physical Therapy Association.

PHYSICAL THERAPY
A question and answer article covering the usual queries received on physical therapy.

PHYSICAL THERAPY—*Suggestions for Prospective Students.*
Outlines the professional course of study for college students preparing for physical therapy.

PHYSICAL THERAPY SECTION: *Its Scope and Employment Opportunities.*
This consists of 12 articles by various contributors on physical therapy in a state crippled children's service, public health service, the cerebral palsy field, the Veterans Administration, the industrial clinic, a curative workshop, a large general hospital, a small general hospital, a children's hospital, crippled children's schools, the physician's office or clinic group and the psychiatric field.

ETHICS FOR THE PHYSICAL THERAPIST: *From the Point of View of the Medical Practitioner.*
HELEN HARDENBERGH, M.D.

PERSONNEL POLICIES FOR QUALIFIED PHYSICAL THERAPISTS
Suggestions as to salary, hours, vacations, etc., by the American Physical Therapy Association.

APPROVED SCHOOLS OF PHYSICAL THERAPY
A list of schools approved by the Council on Medical Education and Hospitals of the American Medical Association.

EDUCATIONAL OPPORTUNITIES FOR PHYSICAL THERAPISTS.
A list of postgraduate programs offered by the approved schools and a list of specialized courses for physical therapists.

CARE OF PATIENTS WITH INFANTILE PARALYSIS: *Correlation in the Nursing and Physical Therapy Services.*
CARMELITA CALDERWOOD HEARST (5c)

POSTURE TRAINING FOR ADOLESCENTS
CAROLYN BOWEN (5c)

THE ORTHOPEDIC SURGEON AND CO-WORKERS IN THE TREATMENT OF POLIOMYELITIS.
C. L. LOWMAN, M.D. (5c)

(Continued on page 116)

A New Device For *Measuring Chest Expansion:**

Chest Expansometer

Louis B. Newman, M.E., M.D.

The usual method of measuring the expansion of the chest during respiration is to place a measuring tape around the circumference of the chest and to note the amount of movement during inspiration and expiration.

Normally, there is approximately equal expansion of both halves of the chest. However, in diseases of the chest, as in tuberculosis, pneumonia, pleurisy, hemothorax, et cetera, the side of the chest involved may have very little, if any, movement with respiration; therefore, by merely measuring the entire circumference of the chest the immobility of one side would not be revealed by the chest measurement. Further, it is important to measure both halves of the chest *simultaneously* in order to determine the excursion of each side and thereby reveal lack of normal movement of each half. Measuring both halves *simultaneously* is necessary for it is difficult for the patient to inhale or exhale the same amount at different times.

With this new device developed by the author for measuring chest expansion, movements of both sides of the chest can be accurately measured *simultaneously*. By this means any loss of mobility of either side of the chest can be readily determined. Measurements repeated at intervals will reveal changes in expansion of the two sides of the chest.

The chest measuring device consists of two small, flexible, steel measuring tapes which are mounted by means of a swivel to the plastic holder (Fig. 1). When measurements are to be taken, a line is marked over the spinous processes of the vertebra at the level at which the tape is to be placed, as well as over the midsternal line, anteriorly. The plastic holder is placed over the selected spot, posteriorly, and the steel tapes drawn over each half of the chest, anteriorly (Fig. 2). A groove on the posterior surface of the plastic holder aids in keeping the device in place while measurements are being taken. The physician or therapist holds the steel tapes with hands crossed (Fig. 3). The patient is then instructed to exhale completely. The moment this is accomplished the therapist draws the ends of both tapes across the midline by uncrossing the hands. Both tapes are read *simultaneously*. This reading will be the exact measurement of each half of the chest in full expiration (Fig. 4).

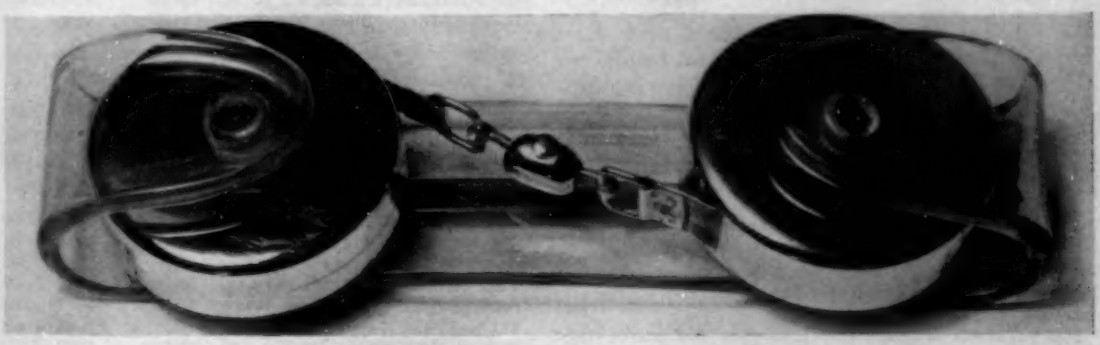

Figure 1. Two flexible steel measuring tapes mounted by swivel joint to the plastic holder.

The same procedure is followed in order to get

Chief, Physical Medicine Rehabilitation Service, Veterans Administration Hospital, Hines, Illinois.

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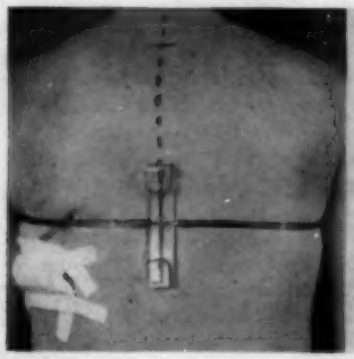

Figure 2. Photograph shows the device for measuring chest expansion placed over the spinous process at the level of the 10th thoracic vertebra. The tapes already have been drawn around the chest, anteriorly.

Figure 3. Photograph shows the anterior view with the therapist holding the ends of the tape (therapist's hands crossed). Patient is ready to either exhale or inhale completely for the measurement desired.

Figure 4. Photograph shows patient with chest in full expansion, both tapes having been drawn across the midsternal line (therapist's hands uncrossed). Both tapes are read simultaneously on the midsternal line.

the exact amount of movement of each half of the chest in full inspiration. Comparative measurements of each half of the chest will reveal any abnormal chest respiratory movement.

The steel tapes are so mounted in metal cases to give uniform spring tension at all times. In using other than spring mounted tapes, a source of error always has been that of unequal tension of the tape during the time of measuring.

This device for measuring chest expansion is small, light, compact, and easily fits into the pocket, being only 4½ inches long and 1 inch wide. In all physical examinations when it is desired to measure chest movements during respiration, this device should be used.

Acknowledgment: The author is greatly indebted to the Medical Illustration Laboratory, at the Veterans Administration Hospital, Hines, Illinois, for the photographs.

Reprints Available

(Continued from page 114)

THE PHYSICAL THERAPIST AND CO-WORKERS IN THE TREATMENT OF POLIOMYELITIS.
LUCILLE DANIELS (5c)

PHYSICAL THERAPY AND CHEST SURGERY
FLORENCE S. LINDUFF. (10c)

BED EXERCISES IN EARLY CONVALESCENCE AND AMBULATION.
NILA K. COVALT, M.D. (10c)

THE RESPIRATOR IN THE TREATMENT OF ACUTE POLIOMYELITIS.
DOROTHY GRAVES. (10c)

PHYSICAL THERAPY IN THE TREATMENT OF NEUROSURGICAL CONDITIONS: *With Special Reference to New Electrodiagnostic Measures.*
EDNA L. DILLON. (10c)

PHYSICAL THERAPY MANAGEMENT OF LOWER EXTREMITY AMPUTEES.
PAIGE WEAVER. (10c)

WALKING TRAINING OF THE AMPUTEE: *Some Biochemical Considerations.*
SIGNE BRUNNSTROM. (10c)

TOYS, GAMES AND APPARATUS FOR CHILDREN WITH CEREBRAL PALSY.
GLADYS G. ROGERS AND LEAH THOMAS. (10c)

GUTHRIE-SMITH APPARATUS: *Its Construction and Use in Rehabilitation.*
KATHRYN S. BIER (20c)

THE PHYSICAL THERAPY REVIEW—*Special Anterior Poliomyelitis Issue.* July-August 1947 (75c)
The magazine contains 11 articles by leading physicians and physical therapists on research and treatment of polio. There are 16 abstracts of articles on polio from current medical journals.

A HISTORY OF THE AMERICAN PHYSICAL THERAPY ASSOCIATION.
IDA M. HAZENHYER. (50c)
An account of the Association's activities and growth from 1921-1946.

THE PHYSICAL THERAPY REVIEW—*Special Cerebral Palsy Issue.* May-June 1948 (75c)
This magazine contains 8 articles by leading physicians and physical therapists on research and treatment of cerebral palsy. There are 5 abstracts of articles on cerebral palsy from current medical journals.

Available free of charge from Joint Orthopedic Nursing Advisory Service, 1790 Broadway, New York 19, N. Y.:

MAKING PHYSICS A PART OF THE CURRICULUM: *Three methods of incorporating physics in the nursing school curriculum.*
HESSEL H. FLITTER, R.N.

Section on Education

Listed below are the courses to be given in 1949-1950 by accredited physical therapy schools and certain specialized centers offering advanced educational opportunities for qualified physical therapists.

Physical Therapy School, Baruch Center of Physical Medicine, Medical College of Virginia. Richmond, Virginia

Registered physical therapists with a baccalaureate degree who hold the certificate or diploma in physical therapy of an approved school, and who are accepted by the Medical College of Virginia for graduate study, may enroll for a Master of Science degree in Physical Therapy. Applicants must have had satisfactory courses in biology, chemistry and physics, and must be able to pass a reading knowledge examination in one foreign language.

A curriculum adjusted to the individual needs of the candidate is set up by the Physical Therapy School of the Baruch Center of Physical Medicine and submitted to the Committee on Graduate Study for approval. The minimum residence requirement is one year. At least one-half of the graduate work must be done within the department of the major. Intradepartmental graduate courses include advanced physiology and research, medical physics, living anatomy, journal club and seminar. Extradepartmental work may be taken in medical anatomy, histology and neuroanatomy. A thesis is required and the candidate must have an examination upon the graduate work offered in support of his candidacy for a second degree. Major emphasis in this program is upon the basic medical sciences and the successful completion of a suitable research project.

Tuition fees are $325 for nonresident students and $275 for residents of Virginia. The matriculation fee is $10 and a $40 deposit toward the tuition fee is payable at the time of matriculation. All students are required to have a physical examination and pay a student health fee of $24, plus an additional $6 if the student remains at the Medical College of Virginia for the summer quarter. The fee for cap and gown is $2.

Candidates eligible for medical school courses may enter at the beginning of the quarter during which the desired courses are given. These commence approximately September 15, January 1, and March 15. Intradepartmental courses are scheduled on the block system between September and June.

Opportunities are available at the Medical College of Virginia Hospitals for advanced clinical practice in general physical medicine, poliomyelitis, cerebral palsy, or the rehabilitation of the severely handicapped. The clinical facilities of the local Veteran's Hospital (McGuire Hospital), which is a paraplegic center, also are available to students through special arrangement with the Dean's Committee. Similar opportunities are available at the Wilson Rehabilitation Center, maintained by the State Division of Vocational Rehabilitation. Clinical practice carries no college credit.

Children's Hospital School of Physical Therapy, Los Angeles, California

Cerebral Palsy

A three months course beginning June 20 will be offered for graduate physical therapists who are members of the American Physical Therapy Association and/or the American Registry of Physical Therapy Technicians. It will include instruction and supervised clinical practice in the physical treatment of cerebral palsy and observation in the diagnostic clinics. Lectures on the medical aspects of cerebral palsy will be given by the examining physician and additional ones on related material by other members of the hospital staff. On satisfactory completion of the class, a certificate is granted. The tuition is $150; the enrollment is limited to four. Applications are to be received one month in advance.

College of Medical Evangelists, Los Angeles, California

Two months specialization work in fever therapy is available for qualified physical therapists and registered nurses. Starting dates are by arrangement. The work carries no university credit.

Columbia University, New York, N. Y.

The Department of Physical Education in Teachers College, Columbia University, is offering

a program in the specialized area of corrective physical education. This program will lead toward the Master of Science degree.

Candidates for the offering must have had undergraduate work in physical education or must have served within civilian life or within the Army or Navy as specialists in "corrective physical education," in "reconditioning," in "rehabilitation," in "physical therapy" or in any allied and recognized field.

The candidates will be held responsible for eight points in Foundations of Education and will have a major of eighteen points within the Physical Education Department: 12 of these points will be prescribed in the specialized area of corrective physical education and rehabilitation. There will be allowance for at least eight points in electives.

Registered physical therapists may enroll for any one of our individual courses except anatomy and physiology. These individual courses may serve as refresher courses and can carry academic credit if the individual can meet the entrance requirements to our program.

Institute for the Crippled and Disabled, New York, N. Y.

A participation course in orthopedic rehabilitation will be offered to graduate physical and occupational therapists commencing April 1st, October 1st, and January 1st, and of three months duration.

The course includes observation and work with all types of disabilities of all age groups in classes scheduled from 9 to 5, Monday through Friday.

No tuition is required, and a statement of attendance will be presented by the Institute on the satisfactory completion of the course.

Inquiries should be directed to the Medical Services, Institute for the Crippled and Disabled, 400 First Avenue, New York 10, New York.

Duke University, Durham, North Carolina

I. A six months' course in the "Psychosomatic Aspects of Physical Therapy" will be given on January 9, 1950.

The course is planned to meet the needs of registered graduate physical therapists who wish to receive further instruction in the treatment of neuropsychiatric patients as well as gain an understanding of the mental attitudes of the acute and chronically ill. In line with the general present day tendency to develop psychosomatic medicine, it emphasizes the neuropsychiatric aspects of physical therapy. The curriculum includes attendance of "staff conference" at which time a case on the psychiatric ward is presented and discussed; special lectures by psychiatrists on "personality," "adjustments," "tension," "anxiety," "patient management" and "advanced neurophysiology." The most significant part of the course is the practical work with certain orthopedic patients who need physical therapy. In addition to administering the physical therapy treatments, the student works on an apprentice basis with the psychiatrist, developing an understanding of the role that anxiety or other emotions play in the patients. Under guidance, the physical therapist develops a knowledge of how to reinforce the effects of the physical procedures with a proper appreciation of the emotional factors in the situation. The work is intensive and the personal contacts between the students and psychiatric staff is close. In addition to this emphasis, opportunity is available for refresher work in hydrotherapy and other subjects with the students in the undergraduate course in physical therapy.

Students who are desirous of advanced credit may simultaneously carry regular credit courses in the University, providing they meet the requirements of the University for graduate study.

The graduate course in physical therapy is open to both men and women. Tuition fee is $150, and a certificate is granted on completion of the six months' course.

II. Graduate courses leading to a M.A. or Ph.D. degree are available in the Department of Physiology. Problems relating to physical therapy may be chosen for the thesis. Applicants must meet University requirements.

A limited number of teaching fellowships are available for the above courses.

For further information or application blank, write to the Division of Physical Therapy, Duke University School of Medicine, Durham, North Carolina.

New York University, New York, N. Y.

The School of Education of New York University offers undergraduate and advanced programs of study for physical therapists who are graduates of courses approved by the Council on Medical Education and Hospitals of the American Medical Association. Since registration in the physical therapy curriculum is at present limited, members of the American Physical Therapy Association and of the American Registry of Physical Therapy Technicians are given preference. Candidates who have met the university and departmental requirements for acceptance may matriculate for the B.S., M.A., or advanced degrees or may enter as special students.

Letters of application for admission to the physical therapy curriculum should be addressed to the Admissions Office, School of Education, New York University, Washington Square, New York 3, N. Y., and should be mailed at least three months preceding the term for which entrance is desired.

The School of Education, in cooperation with the New York University-Bellevue Medical Center, also offers at regular intervals during the academic year a six-week concentrated course in *Rehabilitation of the Physically Handicapped*. The course is open to certified physical therapists who have had two years of physical therapy experience and who are members of the American Registry of Physical Therapy Technicians or the American Physical Therapy Association. Four semester hours of university credit are granted on successful completion of the course. Permission of the Curriculum Director in Physical Therapy, Miss Elizabeth C. Addoms, is required for acceptance. Applications or requests for further information should be mailed to: Miss Edith Buchwald, Director, Rehabilitation Courses for Physical Therapists, Institute of Rehabilitation and Physical Medicine, 325 East 38th Street, New York 16, New York.

Northwestern University Medical School, Chicago, Illinois

Northwestern University Medical School offers the following opportunities for advanced work in physical therapy.

1. Master of Science degree in physical therapy.

Applications from students with the following qualifications will be given consideration:

Those (a) who hold a Bachelor of Science degree or its equivalent from an institution of accepted standing, (b) who offer the following credits: 8 semester hours of college physics, 11 semester hours of general inorganic chemistry and quantitative analysis, (c) who hold a certificate in physical therapy from Northwestern University Medical School, or its equivalent, and (d) who are able to meet the general requirements for admission to the Graduate School.

Courses of Study

Physiological Chemistry C11, C12

C11—Fundamental principles of problem, lipid, and carbohydrate chemistry. Required credit—3 quarter hours. Second quarter.

C12—Study of foodstuffs, enzymatic digestion, absorption and the intermediary metabolism of protein, carbohydrate and lipid. Elective if Physiology D12 is taken. Credit—8 quarter hours. Third quarter.

Physiology C11, D12, D13

Physiology of the blood, circulation, respiration, digestion, metabolism and central nervous system. C11 and D13 required D12 elective when Physiological Chemistry C12 is taken. Credit—12-18 quarter hours. C11—Third quarter, D12—First quarter, D13—Second quarter.

Anatomy D14

The gross microscopical structures of the nervous system and sense organs. Prerequirement for Physiology D13. Credit—11 quarter hours. First quarter.

Research in Physical Therapy: E31

Credit to be arranged, and thesis is required.

2. Course for Instructors in physical therapy.

This course is designed to prepare experienced physical therapists who are interested in the teaching field for instructors in approved schools of physical therapy.

Length of Course: 12 months

Tuition: $250

Prerequisites: (a) Graduation from a course in physical therapy approved by the Council on Medical Education and Hospitals of the American Medical Association plus not less than two years experience in general physical therapy; or (b) Organized courses in physical therapy taken previous to approval of physical therapy courses by the American Medical Association plus five years experience in general physical therapy.

Class limited (two students)

The course consists of: (1) Review of anatomy in dissection laboratory to enable student to be of assistance in teaching anatomy if necessary, particularly applied anatomy.

(2) Neuroanatomy.

(3) Physiology—Review of physiology including laboratory.

(4) Electrotherapy — Review of fundamental principles and new concepts and laboratory experiments.

(5) Review of Accepted Theories and Technics of (a) Massage, (b) Therapeutic Exercise, and (c) Hydrotherapy.

(6) Organization and Administration of Physical Therapy Courses.

(7) General Education Courses.

(8) Methods of Teaching Physical Therapy—(a) Theory (b) Technic.

(9) Preparation of Outlines of Courses Including Sources of Content.

(10) Practice Teaching—Classroom and Clinics.

The content of this course is more or less flexible and can be arranged to suit the applicants' individual needs, depending upon their qualifications.

For further information write: Dean, Northwestern University Medical School, 303 East Chicago Avenue, Chicago 11, Illinois.

Stanford University, California

The Division of Physical Therapy at Stanford University offers programs of study in physical therapy on the undergraduate and graduate level. Students may be candidates for the A.B. and A.M. degrees. A Ph.D. minor also may be taken in physical therapy with the major field in a related area such as physiology, anatomy, physics.

A student who is a graduate of an approved course in physical therapy but who does not have a degree may become a candidate for the A.B. degree in this field providing he or she meets the requirements for admission to the University on an undergraduate level. The program for such a student is developed through conference with the director on the basis of former training and experience.

A graduate who has completed an approved course in physical therapy or who is a member of the American Physical Therapy Association and/or the American Registry of Physical Therapy Technicians and has had experience in the field, may become a candidate for the A.M. degree in physical therapy. The program can be completed in three-quarters of residence providing the undergraduate program was comparable to that at Stanford University. Each student's program is developed through conference with an adviser and includes advanced basic science, survey courses of seminar type and courses in administration and teaching. Opportunities are also available for advanced clinical training in special parts of the field. A thesis is required.

A limited number of teaching fellows can be accommodated. These students should be candidates for an advanced degree and should be interested primarily in entering the teaching field.

Special programs of one or more quarter's duration may be arranged for qualified physical therapists who are interested in further work in basic science and other related fields, or special courses in physical therapy such as "Physical Therapy in the Treatment of Infantile Paralysis," "Physical Therapy in Cerebral Palsy," "Study of a Special Problem in Physical Therapy." The prospective student should write to the director, or confer with her if possible, concerning the field of special interest and the time at which such courses are given.

Tuition and fees are at the rate of $200 per quarter. The average cost of living accommodations is $75 per month.

Workshop in Physical Therapy—
Two weeks, August 15-27, 1949

These courses are designed for graduate physical therapists with experience in the field. Emphasis will be placed on a resume of treatment procedures and an exchange of ideas in regard to basic principles and technics. Lecture-demonstrations in both the classroom and nearby special treatment centers will be a part of the program.

The courses are open to qualified physical therapists. Students on the graduate level may register for 4 units of credit.

227—Physical Therapy for Cerebral Palsy—2 units

242—Functional Activities for the Handicapped —2 units

Miss Robertine St. James, Director of Physical Therapy, Children's Rehabilitation Institute, Cockeysville, Maryland, will be the visiting instructor for the course in the treatment of cerebral palsy and Miss Margaret Knott, Chief Physical Therapist, Kabat-Kaiser Institute, Vallejo, California, will demonstrate technics used in that institution.

Members of the staff of the Rehabilitation Center of San Francisco and the Physical Therapy Department of Stanford will be instructors for the course in functional activities.

All inquiries should be sent to the Director, Division of Physical Therapy, Stanford University, Stanford, California.

State University of Iowa, Iowa City, Iowa

In addition to the regular physical therapy course given at the State University of Iowa, the following work toward a Master's Degree in physical therapy is offered.

Students who have the proper qualifications and interest can register in the Graduate College at the close of the nine months didactic course. By extending their practical training over a longer period they will be able to complete such additional work as may be necessary to meet the requirements for a master's degree.

Fee: The fee for the course is $200.

University of California Medical School, San Francisco, California

Specialized Course:

The University of California offers a four-year course in physical therapy leading to a Bachelor of Science degree. The first three years are spent in the College of Letters and Science, during which time the students are required to take courses which will at the end of that time give them full senior standing. They must also take courses in chemistry, physics, anatomy, physiology, and abnormal psychology. The senior year is spent in the Medical School where the student takes the prescribed physical therapy curriculum. The summer sessions following the senior year are spent entirely in clinical

practice in hospitals affiliated with the University of California.

Graduate Work:

It is not possible to obtain advanced degrees in physical therapy, though a Master of Science degree may be obtained in basic sciences, such as anatomy, physiology or physics. The work will be related to physical medicine. This program is offered to students who have the necessary prerequisites and who have completed an accredited course in physical therapy.

Short Courses:

At this time the University of California Medical School is unable to offer any short "refresher" courses in physical therapy.

The University of Colorado Medical Center, Denver, Colorado

Treatment of Poliomyelitis:

Length of Course: Three weeks.

The course in the treatment of poliomyelitis covers the medical, physical, social and psychological aspects of the disease. The physical therapists emphasis is placed on the physical therapeutic procedures, including hot packs, passive motion, muscle reeducation, muscle testing and gait training.

Starting Dates: March and October.

Graduates of schools of physical therapy approved by the Council on Medical Education and Hospitals of the American Medical Association, and who are members of the American Physical Therapy Association and/or the American Registry of Physical Therapy Technicians are qualified for this program. The director of the poliomyelitis teaching program is Winona G. Campbell, M.D.

For information write: Miss Dorothy Billenstien, R.P.T., Physical Medicine Department, University of Colorado Medical Center, 4200 E. 9th Ave., Denver 3, Colorado.

University of Minnesota Medical School, Minneapolis, Minnesota

The University of Minnesota offers a four-year course in physical therapy leading to a Bachelor of Science degree. The freshman and sophomore years are spent in the College of Science, Literature, and the Arts, during which time students are required to take courses in English composition, physics, zoology, chemistry, psychology, anatomy and bacteriology. Courses in humanities, public health and child welfare are strongly recommended. The junior and senior years are spent in the Medical School where the student takes advanced science courses, as well as his physical therapy work. The last three months of the senior year are spent entirely in clinical practice in the hospitals affiliated with the University of Minnesota.

Each student majoring in physical therapy is required to complete a minor, preferably in a subject related to physical medicine.

Students wishing to take their freshman and sophomore years at another school must have the above-named English and science courses in order to enter as juniors. New classes begin only in September, and each class is limited to twelve students. Applications must be made before July 1 of the year in which the student wishes to enter as a junior. Tuition, 4 years: Residents—$580; nonresidents—$1130.

It is required that a C-plus average be maintained during the time the student is in the medical school.

For qualified physical therapists with a Bachelor's degree, graduate education is offered leading to a Master of Science degree in physical medicine or one of the related basic sciences, such as anatomy or physiology. The field of the major work and thesis may be either in physical medicine or in the basic sciences with the minor in physical medicine. It also is possible to register for suitable courses in education under this plan. Twelve months residence usually is necessary to complete these requirements.

For further information, write the Division of Physical Medicine, 204 T. W. H., University Hospitals, University of Minnesota, Minneapolis 14, Minnesota.

University of Southern California, Los Angeles, California

I. Qualifications for admission: Bachelor's degree with physical education or science background and graduation from an approved school of physical therapy.

Opportunities for specialization: Arrangements can be made with other departments of the University for the properly qualified student. Anatomy, physiology, education, physical education, etc.

Tuition: $14 per unit (min. 28 units)—$392.
Length of time: Minimum—1 year.
Starting dates: September (preferably) and February.
University Credit: Full University credit for all courses.

II. Qualifications for admission: Bachelor's degree in Science or Physical Education with a minimum of 18 upper division units in the major field. (As many as 6 units of a shortage may be met by electives allowed in the program for the Master's degree, and graduation from an approved school of physical therapy.)

Major: 10 units to be chosen from the following:

P.T. 201—Advanced Dissection Anatomy for Therapists (2)

P.T. 203—Manual and Electrical Muscle Testing (2)
P.T. 210—Therapeutics Program for C.P. (2)
P.T. 259—Practicum in P.T. (2)
P.T. 260 ab—Projects in P.T. (2, 2)
P.E. 276—Advanced Corrective P.E. (2)
P.E. 277—Clinic in Physical Therapy (3)
Addition units: 4 units of either "200" or "100" courses (4)
Thesis: P.T. 261 ab—Thesis (2, 2)
Electives: 10 units

Total of 18 units including thesis must be "200" courses.

Medical School courses in the Anatomy and Physiology Departments are available to qualified students.

University of Wisconsin Medical School, Madison, Wisconsin

Master of Science Degree in Physical Therapy.

Prerequisites: Open to physical therapists who hold a certificate in physical therapy from one of the schools accredited by the American Medical Association and who have worked for three years from date of issue of certificate under medical supervision as a physical therapist.

Candidates must satisfy the admission requirements for the Graduate School which is based primarily upon the undergraduate record. There must be 70 semester hours of academic work outside the major and a grade-point average of 1.75 (upon basis of 3.00) to be admitted to full standing. Undergraduate chemistry, physics, zoology, physiology and anatomy are prerequisites.

Course Content: Courses to be taken toward this degree may vary with the individual student, depending on credits already obtained, but usually include the following:

Advanced anatomy or physiology ..... 8 credits
Advanced physical therapy ..... 6 credits
Thesis ..... 4 credits

Length of Course: Usually one year.

Fees: $60 each semester ($100 additional fee for nonresident).

Master of Science Degree in Physical Therapy and Education.

Prerequisites: Open to physical therapists who hold a certificate in physical therapy from one of the schools accredited by the American Medical Association and who have worked for three years from date of issue of certificate under medical supervision as a physical therapist.

Candidates must satisfy admission requirements for the Graduate School (as given above) and in addition the graduate requirements of the School of Education, i.e., an acceptable major of 24 credit hours in education as an undergraduate or have fulfilled requirements equivalent to those set up for the University's Teacher's Certificate.

Course Content: Course will include a minimum of 24 credits of graduate work; 12 credits in education courses and 12 credits in physical therapy, the satisfactory completion of a thesis or seminar report dealing with an educational problem in physical therapy, and a final comprehensive examination as prescribed by the two departments concerned.

This course is designed for teachers and there will be an opportunity for teachers to do practice teaching in the technics of physical therapy.

Length of Course: Usually one year.

Fees: $60 a semester ($100 additional fee for nonresidents).

It is possible to arrange for part of the work to be taken during summer sessions, although it is usually more desirable for students to attend the regular session. For information write to: Harry D. Bouman, Medical Director, Section of Physical Medicine, University of Wisconsin Medical School, Madison 6, Wisconsin.

Children's Medical Center, Boston, Massachusetts

Poliomyelitis—Physical Therapy in Early and Late Convalescent Stages.

Length of Course: 6 weeks, 3 months and 6 months.

Applications considered from graduates of approved schools of physical therapy, from members in good standing of American Registry of Physical Therapy Technicians or American Physical Therapy Association, and from physical therapists from foreign countries whose training and status are acceptable.

All courses will start simultaneously on June 27, 1949. Total enrollment limited to 14. Three month course limited to 6. Special arrangements will be made for students who wish an additional three months which will include all phases of physical therapy in children's orthopedic conditions. Tuition —6 weeks, $100; 3 months, $150. Applications should be received before June 1, 1949.

The six week course will emphasize the essentials of the early convalescent stage and the problems of care during epidemics. Attention will be given to the details of nursing care, methods of applying heat and of preventing deformities, as well as the technics of muscle testing and reeducation and underwater therapy. The care of patients with the bulbar and spinal respiratory forms will be covered.

Those who enroll for the three months course will have further instruction in muscle examination and the technics of treatment plus functional and gait training. Extensive practice with individual case work will be given. Clinical material includes the patients in the Polio Unit of The Children's Medical Center, in the Massachusetts Infantile Paralysis Clinics, and the Wellesley Convalescent Home.

Instruction will consist of lectures, motion pictures, demonstrations and supervised clinical practice. The subjects to be presented are: anatomy, pathology, epidemiology, clinical manifestations, medical and orthopedic aspects, nursing care and physical therapy.

The instructors include Miss Janet Merrill and associates of the Physical Therapy Department and members of the Orthopedic, Pediatric, and Nursing Staffs of The Children's Medical Center.

Applications should be sent to Miss Janet Merrill, The Children's Hospital, Boston 15, Massachusetts.

Children's Rehabilitation Institute, Cockeysville, Maryland

Technics of Treatment of the Cerebral Palsied.

Length of Course: Three months.

Starting Dates for 1949-50:

January 3, 1949; April 4, 1949; July 5, 1949; October 3, 1949; January 2, 1950.

Requirements: Graduates of approved schools of physical and occupational therapy and members of the American Physical Therapy Association, or American Registry of Physical Therapy Technicians, or American Occupational Therapy Association.

Tuition: $150 without maintenance. Assistance in locating living quarters given upon request.

Training Course includes: 75 hours of lectures on methods of treatment for the five classifications of cerebral palsy, etiology, neurology, kinesiology, bracing and apparatus, drug therapy, theory of dominance, surgical procedures, fundamentals of occupational therapy, physical therapy, speech therapy, and teaching technics for the cerebral palsied.

These lectures are presented by Dr. Winthrop M. Phelps and the heads of the therapy, nursing, and educational departments of the Children's Rehabilitation Institute.

The practical work includes 300 hours of observation and treatment of the cerebral palsied.

For further information write: Dorothy D. Cregger, Registrar, Children's Rehabilitation Institute, Cockeysville, Maryland.

Georgia Warm Springs Foundation, Warm Springs, Georgia

Physical Therapy in the Care of Poliomyelitis.

Three months and six months Graduate Course.

This course is open to graduates of courses in physical therapy approved by the Council on Medical Education and Hospitals of the American Medical Association or members of the American Physical Therapy Association and/or American Registry of Physical Therapy Technicians. A limited number may stay six months if selected to do so.

Partial scholarships are available for qualified veterans to supplement the amount allowed under the G. I. Bill of Rights.

Entrance Dates: First Monday of January, April, July and October.

Purpose of Course: To train qualified physical therapists in the care of all phases of poliomyelitis: (1) Accurate muscle strength evaluation. (2) Body mechanics. (3) Muscle reeducation, including underwater exercises. (4) Correct use of assistive and supportive apparatus. The second three months will emphasize functional testing and training.

For further information and application write: Robert M. Bennett, M.D., Director of Physical Medicine, Georgia Warm Springs.

Syracuse University, Syracuse, New York

Workshop on the Problems of Children and Adults with Cerebral Palsy

Division of Special Education, School of Education, Syracuse University, Syracuse, New York, in cooperation with New York State Association for Crippled Children, Inc., The National Society for Crippled Children and Adults, Inc.

Date: July 25-August 12, 1949.

Workshop Director: William M. Cruickshank, Ph.D., Director, Special Education for the Exceptional, School of Education, Syracuse University.

Workshop Coordinator: Mary Eleanor Brown, M.A., Physical Therapist, Field Consultant, New York State Association for Crippled Children, Inc.

Purpose: To offer by lecture, group discussion and demonstration, recent advances in cerebral palsy, to professional workers including physicians, nurses, nutritionists, physical, occupational and speech therapists, educators, psychologists, recreational and social workers, vocational advisers and placement officers, trade school staffs, employers' personnel officers.

Registration: Restricted to 40 persons. Advance registration advised. Address inquiries to Workshop Director.

Description: Mornings will be for classroom

work; afternoons for planned observation periods in the Cerebral Palsy Clinic and other instructional activities to reinforce the various units of the course.

For Physical Therapists: A specially arranged sequence of daily afternoon demonstrations with explanation designed to show a progression of graduated physical therapy technics for cerebral palsied children will be held subject to the number of physical therapists registering. Thus, the course may serve the physical therapist not only as an orientation to the field of cerebral palsy but also as a specific review of physical therapy cerebral palsy technics.

Credit and Fees: Students may register for the Workshop for two hours of graduate or undergraduate credit or they may audit the course. In either event the fee will be $17 per credit hour or $34 payable on the date of registration.

Registration: July 25, 1949, 200 Slocum Hall, Syracuse University (All subsequent meetings of the Workshop, unless otherwise indicated, will be held in the Clinic of the Syracuse Cerebral Palsy and Handicapped Children's Association, Inc., 960 Salt Spring Road, Syracuse, New York.)

Alfred I. Du Pont Institute, Wilmington, Delaware

The Alfred I. du Pont Institute is offering a one year (or part thereof) fellowship at a stipend of $1200 a year or $100 a month to physical therapists who are graduates of approved schools of physical therapy. No room or board can be provided. This fellowship is available for those interested in acquiring further training in crippled children's work.

The duties will include clinic treatment, conferences and rounds attendance. Special instruction by the resident orthopedic staff and by the chief of the physical therapy department will be given.

For further information write Dr. A. R. Shands, Jr., Medical Director, Alfred I. du Pont Institute, Rockland Road, Wilmington 99, Delaware.

Veterans Administration Hospital, Oteen, North Carolina

Employment and experience in physical therapy in the treatment of thoracic surgical (tuberculous and non tuberculous) cases.

The program is under the direction of J. D. Murphy, M.D., Chief Surgeon, and Mrs. Ila J. Amrhein, Chief Physical Therapist.

Duration: 3 months or more.

Salary: At the rate of $2974.80 per year (does not include maintenance.) An employee will not be obligated to remain at the institution following the three month period. If he or she desires to do so, arrangements may be made to continue on regular staff.

Applications must be made on Standard Civil Service Form No. 57 and forwarded in duplicate to the Manager, Veterans Administration Hospital, Oteen, North Carolina, Attention: Personnel Officer.

The Kessler Institute for Rehabilitation, West Orange, New Jersey

The Kessler Institute for Rehabilitation, recently established in West Orange, New Jersey, to provide rehabilitation services for the severely disabled will conduct a postgraduate course in amputee rehabilitation from April 25 through April 29, 1949. The amputee class, covering the five major rehabilitation services—psychological preparation, definitive surgery, after-care of the stump, selection and fitting of prosthesis, and training of the amputee—is open to all registered physical therapists. It is requested that applications for the course be submitted with a registration fee of $10 to Mrs. Noel C. Dousman, Secretary of the Institute.

A gist of the program follows:

Monday, April 25th
- Amputation surgery—Dr. Henry H. Kessler.
- Anatomy and physiology of the stump— Signe Brunnstrom.
- Fundamentals of gait.
- Construction principles of the prosthesis.

Tuesday, April 26th
- Gait study—Signe Brunnstrom.
- Demonstration and discussion of types of prostheses.
- Training of lower extremity amputees.

Wednesday, April 27th
- Principles of the suction socket prosthesis.
- Suction socket training—Film.
- Lower extremity training clinic—Dr. H. H. Kessler, Donald Kerr, Signe Brunnstrom, Genevieve Riley.

Thursday, April 28th
- Amputation surgery—upper extremity—Film.
- Analysis of function of upper extremity—report on studies at the University of California.
- Demonstration of types of upper extremity prostheses.
- Upper extremity training.

Friday, April 29th
- Psychological aspects of amputee training—Dr. H. H. Kessler.
- New developments in lower extremity prostheses.
- New developments in upper extremity prostheses and demonstration of prostheses.
- Social and economic problems in the rehabilitation of the amputee—Dr. H. H. Kessler.

UNIVERSITY OF MICHIGAN LIBRARIES

Short Term Courses in the Care of Poliomyelitis Patients Scheduled During 1949 for Graduate Physical Therapists and Occupational Therapists

FOR PHYSICAL THERAPISTS

Training Center	*Scheduled Courses*	*For Detailed Information and for Enrollment, Write to:*
Children's Medical Center, Boston, Massachusetts	Six weeks and three months, starting simultaneously June 27.	Janet Merrill, Director of Physical Therapy
City Hospital, Cleveland, Ohio	July 25-Aug. 3 Sept. 6-15 Oct. 3-12	John A. Toomey, M.D., Dept. of Contagious Diseases
Georgia Warm Springs Foundation, Warm Springs, Georgia	Three months, beginning July 5 and October 3 (a limited number may stay 6 months if requested)	Robert L. Bennett, M.D., Director of Physical Medicine
Stanford University, Palo Alto, California	One course to be scheduled in summer. Special programs can be arranged for one or more quarters throughout the year.	Lucille Daniels, Associate Professor & Director, Division of Physical Therapy
University of Colorado Medical Center, Denver, Colorado	Apr. 11-30 Oct. 3-22	Dorothy Billenstein, Instructor in Physical Therapy
D. T. Watson School of Physical Therapy, Sunny Hill, Leetsdale, Pennsylvania	Six weeks in Summer	Jessie Wright, M.D., Medical Director

FOR OCCUPATIONAL THERAPISTS

Georgia Warm Springs Foundation, Warm Springs, Georgia	(same as for Physical Therapists above)	Robert L. Bennett, M.D., Director of Physical Medicine
University of Colorado Medical Center, Denver, Colorado	(same as for Physical Therapists above)	Mary Bushinger, Director, Occupational Therapy Department

(For descriptions of most of these courses see announcements above.)

Scholarships for Short Term Courses In the Care of Poliomyelitis Patients

The National Foundation for Infantile Paralysis has just announced that scholarships will be available in 1949 to qualified graduate physical therapists and occupational therapists who need financial assistance to attend short term courses in the care of poliomyelitis patients. Only citizens of the United States who plan to work in this country after completing the training will be eligible. A minimum of two years of clinical experience is required as a prerequisite. In addition, physical therapists must have senior registration by the American Registry of Physical Therapy Technicians and/or membership in the American Physical Therapy Association; occupational therapists must be registered by the American Occupational Therapy Association.

These scholarships will cover transportation and cost of room and board, as well as tuition where charged. Veterans will be expected to use their G. I. educational benefits for courses of three months' or more duration, and therefore will be entitled only to supplementary scholarships. It will be the responsibility of all applicants to arrange their own enrollment directly with the training centers they wish to attend.

Qualified candidates should write to the Professional Education Division of the National Foundation for Infantile Paralysis, 120 Broadway, New York 5, New York, for application blanks and information regarding available courses.

Physical Therapy Teaching Fellowships

Two types of fellowships offered by the National Foundation for Infantile Paralysis are available under this program—long term and short term. Information is given below regarding the requirements for both types.

Long Term Fellowships

Available to physical therapists who wish to prepare for teaching positions in schools of physical therapy approved by the Council on Medical Education and Hospitals of the American Medical Association.

Requirements for Eligibility:

A. Must be a member of the American Physical Therapy Association and/or the American Registry of Physical Therapy Technicians.

B. Must be a candidate for a B.A., B.S. or an advanced degree.

C. Must have a minimum of three years of experience as a physical therapist.

D. Must definitely plan to enter the teaching field and have some assurance of employability.

E. Must present a program of study of not less than one year, or more than two years' duration. The program must include some advanced basic science and at least one course in educational methods as well as some practice teaching. (It is recognized that every program must be planned on an individual basis, and it must be worked out by the applicant and the selected institution. A written approval of the program by the Medical Director of the school must be sent to the National Foundation before an application can be submitted to the Awarding Committee.)

These fellowships will include tuition and a yearly stipend of $2,000 payable monthly.

Short Term Fellowships

Available to physical therapy teachers now employed in the approved schools.

Requirements for Eligibility:

A. Must be a member of the instructional staff of an approved school.

B. Study program must be approved by the Director of the school.

C. Time allowed not to exceed six months.

These fellowships include tuition, traveling expenses, books, and a monthly stipend to cover living expenses at the institution attended plus an amount in accordance with present salary, if it is discontinued during the period of study.

For further information regarding these teaching fellowships write the National Foundation for Infantile Paralysis, Inc., 120 Broadway, New York 5, N.Y.

American Red Cross

The annual report of the American Red Cross for the year ending June 30, 1948, mirrors the accomplishments of this organization in advancing the ideal of service to all mankind. It is a record of achievement, reflecting the teamwork of men and women from all walks of life, banded together in all the chapters and the national staff of the organization.

In a world scarred by fear and tragically confused by failure, such teamwork in the interest of peaceful service should indicate the ever-present opportunity for building toward a better life—a life in which men can live together in dignity and harmony.

This year marks the 50th anniversary of American Red Cross service to the men of the armed forces, an activity begun in the Spanish-American War. Together with aid in disaster, this service has remained through the years one of the major responsibilities of the Red Cross. Today hundreds of Red Cross men and women are stationed with American military forces in camps and hospitals at home and abroad, serving the thousands of young men in the peacetime armed forces of our country. Many others are serving dependents of military personnel through chapter programs in local communities. The program for the men of the armed forces and their families is six times greater than before the war.

The record of practical service outlined in this report shows continuing achievement in the relief and prevention of suffering. But beyond the facts and figures cited here is something bigger: a testament of faith that the world sorely needs. In a century that has seen cruelty spread like a plague across the earth, this saving faith—that all men are brothers, inherently decent and deserving of kindness—must be kept strong at whatever cost. As long as men live by this faith, the work of the Red Cross will ever grow in meaning.

Reservations

Make your reservation now for the 1949 Annual Conference of the American Physical Therapy Association. Use the reservation blank on page 143 of this issue.

SCHOOLS APPROVED FOR TRAINING PHYSICAL THERAPISTS

By Council on Medical Education and Hospitals of the American Medical Association

Name and Location of School	Medical Director	Technical Director	Entrance Requirements*	Length in Months	Classes Start	Tuition	Certificate, Degree, Diploma
CALIFORNIA							
Children's Hospital, Los Angeles	Samuel S. Mathews	Sarah S. Rogers	a-b-d	14	Sept	$300	Cert. or Degree
College of Medical Evangelists, Los Angeles[1]	F. B. Moor	R. Wm. Berdan	a-b-c-d	12	Sept	$225	Cert. or Degree
University of Southern California, Los Angeles	Charles L. Lowman	Charlotte W. Anderson	a-b-d[2]	12	Sept	$496	Cert. or Degree
University of California Medical School, San Francisco[1]	Lucile M. Eising	Margery Wagner	d-e	12	Sept	$220[4]	Cert. or Degree
Stanford University, Stanford[1] (Palo Alto)	Wm. Northway	Lucille Daniels	a-b-d[2]	12	Jan June	$523.30	Cert. or Degree
COLORADO							
University of Colorado Medical Center, Denver	Harold Dinken	Mary Lawrence,	a-b-d	12	Sept	$300	Cert. or Degree
ILLINOIS							
Northwestern University Medical School, Chicago	John S. Coulter	Gertrude Beard	a-b-d	12	Oct	$450	Cert.
IOWA							
University of Iowa Medical School, Iowa City	W. D. Paul	Olive C. Farr	e	12	Sept	$200	Cert.
KANSAS							
University of Kansas School of Medicine, Kansas City	Donald L. Rose	Lilyan G. Warner & Ruth Monteith	a-b-c[3]	12	Feb Sept	$80[4]	Cert. or Degree
MASSACHUSETTS							
Bouve-Boston School of Physical Education, Boston	Howard Moore	Constance K. Greene	H.S.	36	Sept	$500 yr.	Degree
Simmons College, Boston	Wm. T. Green / Arthur L. Watkins	Janet B. Merrill	a-b-d	16-36	Sept	$550	Cert. or Degree
Boston University College of Physical Education for Women: Sargent College, Cambridge 38	Kenneth Christophe	Adelaide McGarrett	H.S.	36	Sept	$435 yr.	Cert. or Degree
MINNESOTA							
University of Minnesota, Minneapolis[1]	Miland E. Knapp	Ruby M. Green	H.S.	36	Oct	$530[4]	Degree
Mayo Clinic, Rochester	Earl C. Elkins	Helen Belknap	a-b-c	12	Jan July	None	Cert.
MISSOURI							
Washington University School of Medicine, Barnes Hospital, St. Louis[1]	Sedgwick Mead	Beatrice F. Schulz	c	2 yrs	Sept	$400 yr.[5]	Degree
St. Louis University School of Nursing, St. Louis[1]	Alexander J. Kotkis	Sr. Mary Imelda	H.S.	36	Jan Sept	$300	Degree
NEW YORK							
Albany Hospital, Albany	John W. Ghormley	Catherine Graham	a-b-d	12	Sept	$250	Cert.
Columbia University, New York City[1]	Wm. B. Snow	Josephine L. Rathbone	a-b-c	1 or 2 yrs	Sept	$450 yr.	Cert. or Degree
New York University School of Education, New York City[1]	George G. Deaver	Elizabeth C. Addoms	a-b-d	12	Sept	$589	Cert or Degree
NORTH CAROLINA							
Duke University School of Medicine, Durham[1]	Lenox Baker	Helen Kaiser	a-b-d	15	Oct	$300	Cert.
PENNSYLVANIA							
D. T. Watson School of Physical Therapy, Leetsdale[1]	Jessie Wright	Kathryn Kelley	a-b-d	12	Oct	$300	Diploma
Graduate Hospital, University of Pennsylvania, Philadelphia[1]	George M. Piersol	Dorothy Baethke	a-b-e	12	Sept	$300	Cert.
TEXAS							
Hermann Hospital School of Physical Therapy, Houston	Oscar O. Selke, Jr.	Mary Elizabeth Kolb	a-b-d	12	Oct	$300	Cert. or Degree
University of Texas School of Medicine, Galveston	G. W. N. Eggers	Ruby Decker	a-b-d	12	Jan	$163[4]	Cert.
VIRGINIA							
Baruch Center of Physical Medicine of the Medical College of Virginia, Richmond[1]	Walter J. Lee	Susanne Hirt	a-b-c[3]	12	Sept	$351[4]	Cert. or Degree
WISCONSIN							
University of Wisconsin Medical School, Madison[1]	Harry D. Bouman	Margaret Kohli	a-b-c[3]	12	Sept	$120[4]	Cert. or Degree

*Courses are so arranged that any of the entrance requirements will qualify students for training. a = Graduation from accredited school of nursing; b = Graduation from accredited school of physical education; c = Two years of college with science courses; d = Three years of college with science courses; e = Baccalaureate degree; H.S. = High School graduation.

[1]Male students are admitted.

[2]High school graduates accepted for a four-year course leading to A.B. degree.

[3]High school graduates accepted for four-year college course.

[4]Nonresidents charged additional fee.

[5]Certificate granted by Children's Hospital Society; degree granted by University of California at Los Angeles.

[6]Tuition reduced second semester of second year.

Editorials

Educational Opportunities

In the Section on Education of this issue may be found descriptions of the graduate programs offered by several of the physical therapy training centers. These opportunities for study on the graduate level are varied and comprehensive. They range from special courses in specific fields to Master of Science degree courses. Formerly the two most commonly offered courses were those in treatment of poliomyelitis and cerebral palsy. Now one notes the increase in scope to include rehabilitation, chest conditions, multiple sclerosis, corrective physical education, psychosomatic aspects of physical therapy and fever therapy.

Many physical therapists are interested in specializing and are desirous of keeping up with the latest developments in that field. Others, particularly those in teaching positions, may find it desirable or necessary to earn degrees. Still others are concerned chiefly with taking a general refresher course just to bring them up-to-date on the latest trends in physical therapy. In any case, these graduate programs provide an opportunity to gain additional knowledge and skill which will result in better service to the patient as well as furnishing a chance to earn academic credit.

As in any scientific or educational field, physical therapy constantly is changing in some aspects. For example, in recent years the emphasis has been on treatment of the whole individual rather than restricting treatment to an affected part.

You will find it worthwhile to survey carefully the courses listed with consideration of your own needs for further education.

A. M. A. Offers Constructive Health Program

The American Medical Association has announced a new, 12-point health program for the advancement of medicine and public health which THE JOURNAL says is "far more comprehensive than any yet proposed."

"It has the advantage," THE JOURNAL says in an editorial in the February 19 issue, "that it can be developed and administered as a logical evolution from the existing institutions in the United States without bringing about chaos through a complete overthrow of what has already been admitted by everyone to be the highest quality of medical care available in any country in the world."

The 12-point program, developed over a period of years with a view to charting a safe and sure road toward advancement of the nation's health, was approved and adopted by the Board of Trustees of the American Medical Association. The program follows:

A Federal Department of Health

1. Creation of a Federal Department of Health of Cabinet Status with a Secretary who is a Doctor of Medicine, and the coordination and integration of all Federal health activities under this Department, except for the military activities of the medical services of the armed forces.

Medical Research

2. Promotion of medical research through a National Science Foundation with grants to private institutions which have facilities and personnel sufficient to carry on qualified research.

Voluntary Insurance

3. Further development and wider coverage by voluntary hospital and medical care plans to meet the costs of illness, with extension as rapidly as possible into rural areas. Aid through the states to the indigent and medically indigent by the utilization of voluntary hospital and medical care plans with local administration and local determination of needs.

Medical Care Authority with Consumer Representation

4. Establishment in each state of a medical care authority to receive and administer funds with proper representation of medical and consumer interest.

New Facilities

5. Encouragement of prompt development of diagnostic facilities, health centers and hospital services, locally originated, for rural and other areas in which the need can be shown and with local administration and control as provided by the National Hospital Survey and Construction Act or by suitable private agencies.

Public Health

6. Establishment of local public health units and services and incorporation in health centers and local public health units of such services as communicable disease control, vital statistics, environmental sanitation, control of venereal diseases, maternal and child hygiene and public health laboratory services. Remuneration of health officials commensurate with their responsibility.

Mental Hygiene

7. The development of a program of mental hygiene with aid to mental hygiene clinics in suitable areas.

Health Education

8. Health education programs administered through suitable state and local health and medical agencies to inform the people of the available facilities and of their own responsibilities in health care.

Chronic Diseases and the Aged

9. Provision of facilities for care and rehabilitation of the aged and those with chronic disease and various other groups not covered by existing proposals.

Veterans' Medical Care

10. Integration of veterans' medical care and hospital facilities with other medical care and hospital programs and with the maintenance of high standards of medical care, including care of the veteran in his own community by a physician of his own choice.

Industrial Medicine

11. Greater emphasis on the program of industrial medicine, with increased safeguards against industrial hazards and prevention of accidents occurring on the highway, home and on the farm.

Medical Education and Personnel

12. Adequate support with funds free from political control, domination and regulation of the medical, dental and nursing schools and other institutions necessary for the training of specialized personnel required in the provision and distribution of medical care.

Commenting on various points of the program, THE JOURNAL said, editorially:

Many of the planks in this platform have been advanced by the American Medical Association for many years. Thus the American Medical Association has urged the creation of a Federal Department of Health of cabinet status, in which all federal health activities could be coordinated and integrated, for more than seventy-five years.

The National Science Foundation bill was passed in 1948 by both the Senate and the House and vetoed by the President because of differences on the manner of administration. No doubt such differences of opinion will be adjusted and this measure will become effective.

The American Medical Association is now committed to urging the widest possible extension of sound systems of voluntary prepayment plans to meet the costs of hospital and medical care. Much confusion has resulted from differences of opinion as to how such extension could be best achieved, whether by a national insurance company, which would combine Blue Cross and Blue Shield plans or by a coordination of voluntary and private prepayment plans into a single organization which would contract with the Blue Cross for various services. During the past week extensive negotiations have been held among those especially interested in this phase of the problem, and steady progress is being made toward a mutually satisfactory solution.

Among the difficulties in meeting the problems of persons in the low income group and of the indigent is the difficulty of utilizing funds developed by the individual states and the federal government without the establishment of a great new bureaucracy or the nationalization of health activities. The proposal has been made that there be established in each state a medical care authority or board which could receive such funds and distribute them where the need could be shown. The Association recognizes the right of the consumer in planning for medical care and urges proper representation of both medical and consumer interests on such state medical care authorities.

Today in the United States all persons properly informed as to medical conditions recognize the need for the establishment of diagnostic facilities and health centers, particularly in remote areas in which physicians do not go simply because provision is not made for the use of technics of clinical pathology and roentgen ray, which are inseparable from good medical practice. The American Medical Association recognizes that funds have already been provided by the National Hospital Survey and Construction Act not only for the extension of hospital services but also for the development of diagnostic facilities and health centers. Notwithstanding the fact that everyone concerned urged the passage of this act, the actual functioning has been pitifully slow. Whether or not the delay can be laid to local, state or national agencies concerned in this phase of progress, the fact remains that the leadership that should have come from federal agencies in promoting properly the development of these facilities has been noticeable by its absence.

All the health agencies in the United States are urging the extension of local public health units and services throughout the nation. Again and again leaders have pointed out that almost half of the counties in the United States are without such services. Through such local public health units the control of communicable diseases and of venereal diseases may be exercised. Here the vital statistics for the community may be assembled. In such agencies plans may be devised for maternal and child hygiene and for the extension of sewage facilities, which are lacking in thousands of communities. Here also the public health center may be located and public health laboratory services maintained. Notwithstanding the forward-looking aspects of this program, everyone should recognize that the greatest lack is in personnel. Our public health schools do not develop enough public health officials to meet the need, and technicians in all the accessory professions are also in short supply.

Finally, the remuneration of public health officials is ridiculously small in view of the tremendous responsibilities that they carry for the health of the people.

The investigations that have been made in recent years indicate that psychiatric problems are coming rapidly to the fore as a primary cause of disability and illness. During the war institutions for the care of the mentally disturbed suffered the deterioration that was characteristic of many other medical agencies, in most instances due to lack of funds. Thus any comprehensive program for the care of public health must require the development of a program of mental hygiene and the establishment of mental hygiene clinics in suitable areas.

Experience has shown that vast numbers of people are not only unaware of the basic principles of personal and public hygiene but also unaware of easily available medical facilities in their own neighborhoods. These people can be reached only by a program of health education directed specifically to them and utilizing the mediums of information with which they would be continuously in contact. Health education should be a function not only of federal agencies but also of state and local public health agencies and of the medical profession. The philanthropic and voluntary health organizations in the United States do a far better job in relation to such conditions as cancer, tuberculosis, heart disease, infantile paralysis and other conditions than do the governmental agencies.

As far as can be determined, proposed legislation, including that for compulsory sickness insurance, would not reach the aged. Neither would it satisfactorily cover those with long standing chronic diseases nor such underprivileged groups as the Negro population and the Indians. Certainly special legislation would be required to provide facilities for care and rehabilitation of these groups.

More emphasis on industrial medicine and the prevention of unnecessary accidents would vastly benefit the American people. Today accidents are fourth in the list of the causes of death. A suitable program on prevention of accidents would make available, according to recent estimates, more than ten and possibly 15 per cent of the beds now occupied in all hospitals by the victims of accidents.

Finally a system of medical care cannot rise above the level of the medical, dental and nursing education and the accessory medical professions. Today these agencies are without adequate funds to bring about necessary improvements. A voluntary foundation is in process of development in order to secure additional funds. Conceivably the states will do more for their state medical schools than they have done in the past. Possibly also federal funds may be necessary, but whenever governmental funds are used they must be employed under some system that would make their use free from political control, domination and regulation by governmental agencies.

Campaign to Speed Medical Research

Uniting in a simultaneous effort throughout the United States, 99 national scientific and civic organizations will seek to speed medical research through a campaign announced recently by Dr. Anton J. Carlson, President of the National Society for Medical Research. The campaign, which is to be directed against research bans erected by the anti-vivisection cult, comes at a time when legislative battles on the "vivisection" question are raging in many states.

"The purpose of our national educational effort," Doctor Carlson stated in his announcement, "is to eliminate the paradoxical misunderstanding which makes some people support vast appropriations for medical research on one hand and oppose the work which is done with the money on the other.

"These people simply do not understand that all medical science depends upon the study of living creatures—their body functions, their dysfunctions or diseases, and the effect of various treatments upon them. In other words, all medical science is based upon 'vivisection,' which is defined by the anti-vivisection cult as experimentation with living creatures.

"Persons can oppose the study of life for the purpose of learning how to protect life if they want to, but we would like to so clarify the issue that persons who really want medical research to continue are not working to defeat their own interests through misunderstanding."

Doctor Carlson explained that most national magazines, many advertisers, and several thousand clubs, associations and colleges are cooperating in this attempt to clarify the meaning of the one word "vivisection" through a cooperative public educational effort to take place during the month of March.

Organizations cooperating in the attempt to clarify the vital role of experimentation in medical progress include: American Dental Association, American Diabetes Association, American Medical Association, American National Red Cross, American Public Health Association, American Veterinary Medical Association, Association of American Medical Colleges, National Research Council, National Foundation for Infantile Paralysis, National Science Teachers Association, and United States Junior Chamber of Commerce.

Annual Conference of the American Physical Therapy Association

Copley Plaza Hotel, Boston, Massachusetts

JUNE 19-24, 1949

Sunday, June 19

11:00 a. m. "Brunch" School Section
3:00 p. m. Registration
7:30 p. m. Formal opening of 26th Annual Conference — Lois Ransom, President, American Physical Therapy Association
Greetings from Massachusetts Chapter
"New Horizons and New Responsibilities" — Howard A. Rusk, M.D., Director, Institute of Rehab. and Phys. Med., New York Univ. — Bellevue Med. Center, New York, N. Y.

Monday, June 20

9:00-12:00 noon General Session — House of Delegates
12:00- 2:00 p. m. Luncheon
2:00- 5:00 p. m. The Neurological Basis for Treatment of the Hemiplegia
"Methods of Reducing Spastity in Certain Types of Hemiplegia" — Temple Fay, M.D., Director, Neuro-Phys. Rehab. Clinic, Phila., Pa.
"The Rehabilitation of the Hemiplegia Patient"—Donald A. Covalt, M.D., Clinical Director, Institute of Rehab. and Phys. Med., New York Univ. — Bellevue Med. Center, New York, N. Y.
7:30- 9:00 p. m. Movies

Tuesday, June 21

9:00-12:00 noon The Neurological Basis for Treatment of Cerebral Palsy
"Neurological Aspects of Cerebral Palsy" — Temple Fay, M.D., Director, Neuro-Phys. Rehab. Clinic, Phila., Pa.
Subject and speaker to be announced
12:00- 2:00 p. m. Luncheon
2:00- 5:00 p. m. General Session — House of Delegates
7:30 p. m. Banquet (Informal)

Wednesday, June 22

9:00-12:00 noon Poliomyelitis
"Poliomyelitis" — Thomas Gucker III, M.D., Mass. Infantile Paralysis Clinics of Children's Hosp., Boston, Mass.
"Early Care of the Poliomyelitis Patient" Demonstration — Shirley Cogland, Asst. Technical Director, Dept. of Phys. Therapy, Children's Hosp., Boston, Mass.
Theresa Fallon, Consultant, Joint Orthopedic Nursing Advisory Service, New York, N. Y.
12:00- 2:00 p. m. Luncheon
2:00- 4:00 p. m. The Neurological Basis for Treatment of Multiple Sclerosis
"Multiple Sclerosis" — Leo Alexander, M.D., Director, Multiple Sclerosis Clinic, Boston, Mass.
7:30- 9:00 p. m. General Session — House of Delegates

Thursday, June 23

9:00-12:00 noon "Some Research Problems in Physical Therapy" — Arthur L. Watkins, M.D., Assoc. in Med., Harvard Med. School, Chief of Phys. Med., Mass. Gen. Hosp., Boston, Mass.
Papers on Research — Graduate Students in Physical Therapy Schools — selection of papers to be announced
12:00- 2:00 p. m. Luncheon
2:00- 5:00 p. m. Arthritis
Subject to be announced — Walter Bauer, M.D., Mass. Gen. Hosp., Boston, Mass.
"Some Psychiatric Problems Related to Arthritis" — Alfred O. Ludwig
"Physical Therapy in the Treatment of Arthritis" — Mary L. Nesbitt, Supervisor, Phys. Therapy Dept., Mass. Gen. Hosp., Boston, Mass.
7:30 p. m. Concert — Boston "Pops"

Friday, June 24

9:00-12:00 noon Clinical Demonstrations
Main Amphitheater, Peter Bent Brigham Hosp.
"Fractures" — T. B. Quigley, M.D., Asst. Chief of Surgery, Peter Bent Brigham Hosp., Boston, Mass.
Auditorium — Massachusetts General Hospital
"The Beasley Electronic Myodynamometer"—Arthur L. Watkins, M.D., Assoc. in Med., Harvard Med. School, Chief of Phys. Med., Mass. Gen. Hosp., Boston, Mass.
"De Lorme Exercise Table"—Thomas De Lorme, M.D., Research Fellow, Dept. of Phys. Med., Mass. Gen. Hosp., Boston, Mass.
12:00- 2:00 p. m. Luncheon
2:00- 4:00 p. m. "Open House" in various physical therapy clinics in the Boston area

School Section Program, June 1949

(Speakers to be announced in April Issue)

Sunday, June 19th

11:00 A. M. "Brunch" (Copley Plaza)
- Introduction—Helen Kaiser, Chairman of Organizing Committee
- Welcoming Address
- Business Meeting
  - Minutes
  - Report of Organizing Committee
  - Report of Committee on Education
  - Nominations for Officers

Saturday, June 25th

9:30 A. M.-12:30 P. M. (Simmons College—Room to be announced later)
- Welcoming Address
- Panel Discussion: Teaching Methods in Clinical Practice Supervision
- Round Table: School Administration Problems in Relation to Clinical Practice
- Topics to be discussed: Basis for selection of facilities; extramural assignment at a considerable distance from the school; qualifications of supervisors; student remuneration in the form of board, meals, laundry, transportation costs, etc.; experience included under "clinical practice"; correlation of technics as taught by teaching staff and different clinical practice supervisors; extent and type of medical supervision.
- Election of Officers

2:00 P. M.-4:15 P. M.
- Patient Instruction: Methods of Teaching Students to Give Adequate Oral and Written Instruction to Patients and Parents.
- Round Table: Means of Coordinating Diverse Student Backgrounds in Professional Education
- Course Content—Ethics

Conference Reservations

A reservation blank for your convenience is provided on page 143 of this issue. Be sure to get your reservation in early.

Association Activities

Nominations for Director

At the semi-annual meeting of the Executive Committee Louise Bailey, Special Consultant for the National Society for Crippled Children and Adults, Inc., was appointed to the office of director which had been held until his death by Mr. Henshaw. According to the by-laws this appointment is filled until the next regular session of the House of Delegates at which the House shall elect for the unexpired portion of the term.

The Chairman of the Nominating Committee, Lucille Daniels, requests that any further suggestions for this office be sent to the National Office no later than April 5, 1949, for consideration by her committee. Mr. Henshaw was elected for a two-year term, 1948-50. All suggestions should be accompanied by a statement supporting the nominee and should include a resume of activities and participation in association affairs.

Committees Appointed

At the semi-annual meeting the president was asked to appoint two committees.

(1) To study the use of the physical therapist without a nursing background in a public health program:

Mary McDonald, Visiting Nurse Association, Boston, Chairman.

Clara Arrington, Physical Therapy Consultant, Children's Bureau.

Lucy Blair, Consultant, Joint Orthopedic Nursing Advisory Service.

(2) To study and present a job write-up for non-professional assistants in a physical therapy department:

Mary Haskell, Chairman.

Mary Nesbitt, Massachusetts General Hospital, Boston.

Esther Anderson, Hudson Jay Clinic, U. S. Public Health Service, New York.

Florence Linduff, Chief Physical Therapist, Veterans Administration, Washington, D. C.

Sister Rosamunda, St. Johns Hospital, Tulsa, Oklahoma.

Membership Directory

A geographical membership directory is to be published soon. Work on it has started and it is hoped to have it ready in May.

Field Trips

Mildred Elson, February 14-24—Chicago, Illinois, and Madison, Wisconsin.

Barbara White, March 3-31—Colorado, New Mexico and Texas.

Lois Ransom, March 10-April 10—Montana, Washington, Oregon and California. Miss Ransom, while on an official trip for the U. S. Public Health Service, will visit Butte, Montana, for organization of chapter and chapters in the other states mentioned.

Louise Bailey, our new director, travels extensively and it is planned to notify chapters whenever she is in their area in order that they may meet with her when possible.

New Chapters

It is hoped very soon to have chapters organized in New Hampshire, Vermont, Montana, Idaho and New Mexico. This will leave only Mississippi, North and South Dakota and Nevada without chapters.

Wanted

Our supply of copies of the January-February 1947 issue of the REVIEW is completely exhausted. We would appreciate receiving copies from any member who wishes to donate these to the National Office.

Correction

An error occurred on page 79 of the February, 1949 issue of the REVIEW. Under "Exhibits" Figure 1 should have been marked Figure 2 and vice versa.

Membership News

Personals

• Edith M. Burt, former secretary of the Kansas Chapter, is now in Warm Springs, Georgia, taking the postgraduate course. Nancy Nevin has been elected by the Executive Committee of the Chapter to serve the unexpired term.

• Phyllis Burton, formerly employed at Ford Hospital, is now on the Grace Hospital staff in Michigan.

• Mrs. Edna Dinieus has resigned from Wyandotte General Hospital, Michigan, and is now in Washington, D. C., at the Georgetown University Hospital.

• Virginia Lucas and Margaret Vilmar are working at City Hospital, Cleveland, Ohio.

• Katheryn Jones Saxer has a baby boy.

• Ruth Burnet recently opened the Barney Cerebral Palsy Center in Dayton, Ohio.

• Beverly Schafer, who spent over two years at the VA Hospital in Dallas, Tex., is now at the Nichols VA Hospital, Louisville, Ky.

• Margaret Motch, formerly of Indianapolis, Ind., is now working in the Regional VA offices, Louisville, Ky.

• Louis Newman, M. D., Chief of Physical Medicine and Rehabilitation at the Veterans Administration, Hines, Illinois, was a recent visitor to the National Office.

E. Othelia Johnson of St. Paul, Minnesota, a charter member of the Association, died December 19, 1948. Miss Johnson trained at Reed College and served with the U. S. General Hospital #29 at Fort Snelling, Minnesota. After the war she was in Chicago at the U. S. Public Health Service Hospital #30. In 1921 she returned to St. Paul. Miss Johnson was held in high esteem by all her professional colleagues. She was an inactive member at the time of her death.

Marriages:

Helen F. Kinser of Bedford, Ohio, is now Mrs. Helen Spark.

Marion Figley of Columbia, Missouri, is now Mrs. Marion F. Stelzer.

E. Plummer Wooten of Durham, N. C., is now Mrs. Plummer W. Melero.

Gertrude Paletz of Atlantic City, New Jersey, is now Mrs. Gertrude P. Spangler.

Barbara C. Oak of Vallejo, California, is now Mrs. Barbara O. Robinson.

Anne Blackstock of Gunnison, Colorado, is now Mrs. Anne B. Allen.

Cecile Culbertson of Kingsport, Tennessee, is now Mrs. Cecile C. Nash.

Thersa Doda of Boston, Massachusetts, is now Mrs. Paul Spaser.

Lt. Jeannette Kezer of Milwaukee, Wisconsin, is now Lt. Jeannette K. Fugina.

Carol Long of Baltimore, Maryland, is now Mrs. Carol Bing.

Verona Hardy of Palo Alto, California, is now Mrs. Verona H. Phillips.

Lily M. Hoffman of Rockford, Illinois, is now Mrs. James Downing.

Mary Jane Kanney of Richmond, California, is now Mrs. Robert F. Barber.

Anita L. Kozak of Marquette, Michigan, is now Mrs. Leslie Lowenstein.

Betty Heston of El Dorado, Kansas, is now Mrs. Forrest Dale Stine.

Chapter Activities

• *Eastern Michigan Chapter:* Dr. M. K. Newman has been giving a series of lecture-movies on "Rehabilitation" at Grace Hospital.

• *Kansas Chapter:* The Relations and Education Committees of the Kansas Chapter have prepared a radio script on "Physical Therapy—A Service and a Career." The first broadcast was given by Lilyan Warner, Relations Chairman, on January 28th over KFKU. It is planned to have it repeated by other members on local Kansas radio stations. The script was excellently written and should interest many in physical therapy.

• *Kentucky Chapter:* Dr. W. McDaniel Ewing, Orthopedic Surgeon, Louisville, spoke on "High Resistive Exercises" at the January meeting. He brought out the underlying principles of high resistive exercises which was of great interest to all. Doctor Ewing advocated early ambulation of polios if the weakened muscles were properly protected.

Coming programs of the Kentucky Chapter include: February — "Braces," by Dr. Charles F. Wood; March—"Spinal Cord Injuries from Physical Therapy Standpoint" to be discussed by Dr. R. Glen Spurling; April will be a business meeting, and May—"Multiple Sclerosis," by Dr. E. Roseman.

• *New York Chapter:* The New York Chapter, Inc., is offering to its members a series of five weekly lectures as follows: (1) Relaxation—Alma Kelly, Ph.D., Physical Therapist. (2) Joint Measurements—To be announced. (3) Physical Therapy in Chest Conditions—Florence Linduff, Chief Physical Therapist, Veterans Administration. (4) Testing in Cerebral Palsy—Hans Kraus, M. D., Assistant Professor of Clinical Rehabilitation, New York University, College of Medicine. (5) Stretching and Resistive Exercises—Rene Cailliet, M. D., Medical Supervisor, Kabat-Kaiser Institute, Washington, D. C.

• *Ohio Chapter:* The Southwestern District held its January meeting at Jewish Hospital, Cincinnati. Doctor Seltz spoke on "The Relationship of Poliomyelitis to Tonsillectomies."

• *Washington Chapter:* The Washington Chapter held a February meeting at the Virginia Mason Hospital Nurses' Home. The guest speaker was Dr. Edward A. Rogge who spoke on "Postoperative Knees."

• *West Virginia Chapter:* The West Virginia Chapter, Inc., will hold its Spring meeting in Parkersburg, W. Va. Guest speaker for the meeting will be Dr. A. R. Lutz, Orthopedist, who will discuss "Orthopedic Operations in Cerebral Palsied Patients."

New Members

• The following are newly accepted members of the American Physical Therapy Association:

Mabel Abray
Mrs. Virginia de Lemos
Elizabeth O. Emory
Margaret Hebert
M. Elizabeth Pogue
Margaret S. Rood
Mrs. Rita D. Thompson
Katherine Timoteo
Janet A. Wessel

• Recent graduates and former student members of the following schools:

Children's Hospital, Los Angeles:
Betty K. Fansler
Mrs. Marie C. Loberstein

D. T. Watson School of Physical Therapy:
Margaret Van Wart

New York University School of Education:
Sister Adrienne de l'Immaculee

Stanford University:
Hazel V. Adkins
Catherine Chassell
Clarence R. Hix
Frances M. Laterza
Julia M. Lawrence
Olga M. Mocher
Buena M. Stewart
Bernice Todd
Kathleen Winters

University of Colorado Medical Center:
Dean M. Gardiner

University of Iowa:
Harlan E. George

University of Texas:
Leo Betzelberger

University of Wisconsin Medical School:
Mrs. Madelyn H. Udy

• Newly accepted *student* members:

Columbia University:
John F. Burke

University of Texas:
Florence M. Barenberg
Harold D. Bell
Frances G. Hampston
Rosemary V. Johnson
John W. Moyer

General News

• The Therapeutic Section of the American Association for Health, Physical Education and Recreation is planning an all-day visit to observe the Physical Medicine and Rehabilitation Service at the Cushing Veterans Hospital, Framingham, Massachusetts, on April 18th. Physical therapists are invited to join with the Therapeutic Section in making this tour.

In addition to this visit, the Therapeutic Section

group is planning a luncheon meeting for Thursday noon, April 21st. The speaker and place will be announced later. Again the physical therapy group will be welcome.

The program for the Therapeutic Section follows:

Friday, April 22, 1949—11:00 A.M. to 12:30 P.M.

Business meeting and election of officers

Report of the Committee on Physical Education and Recreation in Rehabilitation—Dr. H. Harrison Clarke

Illustrated lecture on "The Treatment of Athletic Injuries"—Augustus Thorndike, M.D., Harvard University Medical School

Panel on "The Treatment of Athletic Injuries"

Augustus Thorndike, M. D.—Panel Chairman and Summarizer

Members:

Arthur L. Watkins, M.D., Chief of Physical Medicine, Massachusetts General Hospital, Boston, Mass.

W. R. McCausland, M.D., Boston, Mass.

Ruth Atwell, Director of Physical Education for Women, The George Washington University, Washington, D. C.

Erasmus D. Pennock, Springfield College, Springfield, Mass.

Question and answer period

• The first National Conference and Exposition on Cerebral Palsy was held in New York from February 6-10, 1949, at the Hotel Statler.

An excellent program was presented with sections for professional personnel as well as general sessions for parents and others interested in the problem of the cerebral palsied.

Dr. Winthrop Phelps opened the conference speaking on "Cerebral Palsy as a National Problem."

Robertine St. James, Elizabeth Addoms and Louise Suchomel, members of the American Physical Therapy Association, were participants on a program with the theme "Physical Restoration, Diagnosis and Treatment."

Every aspect of the care of the cerebral palsy patient was presented including medical, dental, psycho-social and education.

Many physical therapists attended from all over the country as well as those from New York City and vicinity.

The Association also was among the exhibitors presenting Kodachrome slides showing physical therapy education and physical therapy treatment.

It was a most stimulating conference and one could not help but learn a great deal and be encouraged with the advances made in the overall care of the cerebral palsy patient. The importance of treating him as a whole person as well as the importance of considering him as a member of the family and the community was emphasized by many of the participants. There was a plea for more research and better screening of patients feasible for treatment.

There is no cure for cerebral palsy but much can be done through an intelligent approach to the problem by all concerned with it.

• The Connecticut Chapter of the Association together with the Connecticut Occupational Therapy Association and Rehabilitation Association sponsored a Rehabilitation Conference at the State Veterans' Hospital and Hospital for Chronic Disease, Rocky Hill, Connecticut. Nila Covalt, M. D., is Chief of Physical Medicine at Rocky Hill.

The program included discussion and demonstration of group therapy, individual treatment, speech therapy, activities of daily living and patient recreation. There also was opportunity for small discussion groups conducted by a physical therapist, an occupational therapist and a physician as moderator. The subjects were (1) neurological problems, multiple sclerosis, amyotrophic lateral sclerosis, Parkinson's, etc; (2) peripheral vascular disease; (3) amputees; (4) arthritis; (5) hemiplegia, and (6) tuberculosis and chest surgery.

• The University of Wisconsin Medical School, Section on Physical Medicine, sponsors a joint meeting of the Wisconsin Chapter of the American Physical Therapy Association and Wisconsin Occupational Therapy Association at The Service Memorial Institutes, Auditorium, Room 230, The University of Wisconsin Medical School, Saturday and Sunday, April 2 and 3, 1949, in Madison, Wisconsin. The program is as follows:

Saturday, April 2

1:30 P.M.	Opening of the meeting: Norma Smith, President, Wisconsin Occupational Therapy Assoc. Charles Safford, President, Wisconsin Chapter, American Physical Therapy Assoc.
1:45 P.M.	Welcome: Dr. William S. Middleton, Dean, Univ. of Wis. Med. School, Prof. of Med. Dr. Harold M. Coon, Supt., State of Wisconsin Gen. Hosp. and Wisconsin Ortho. Hosp. for Children, Executive Secretary, Univ. of Wis. Med. School, Prof. of Hospital Administration. Dr. Harry D. Bouman, Prof. of Phys. Med., Med. Director, Section of Phys. Med.
2:15 P.M.	Rehabilitation of the Amputee Dr. Henry H. Kessler, Director, Hasbrouck Heights Amputee Clinic, Newark, N. J.
3:15 P.M.	Question period
3:30 P.M.	Rehabilitation of the Heart Patient Dr. Chester M. Kurtz, Assoc. Prof. of Clinical Med. (Cardiology), Univ. of Wis. Med. School.
4:15 P.M.	Rehabilitation of the Multiple Sclerosis Patient Dr. Hans H. Reese, Prof. of Neuropsychiatry, Univ. of Wis. Med. School.
4:45 P.M.	Business meetings. Wisconsin Chapter, American Physical Therapy Assoc. and Wisconsin Occupational Therapy Assoc.
6:30 P.M.	Dinner, Wisconsin Memorial Union Speaker: Dr. A. B. C. Knudson, Chief, Rehabilitation and Physical Medicine Div., Vet-

erans' Adm., Washington, D. C.
Subject: Physical Medicine and Rehabilitation in the Veterans Administration.

Sunday, April 3

9:30 A.M. The Rehabilitation of the Tuberculous Patient
Miss Borghild Hansen, Director of Occupational Therapy, Univ. of Minn.

10:30 A.M. The Psychological Approach to a Treatment Program for the Handicapped
Dr. Marc J. Musser, Assoc. Prof. of Med. (Psychosomatic Med.), Univ. of Wis. Med. School.

11:00 A.M. Modern Aspects of Virus Research in Poliomyelitis
Dr. A. Fred Rasmussen, Assoc. Prof. of Med. Microbiology, Univ. of Wis. Med. School.

Noon Luncheon in Medical School Cafeteria

2:00 P.M. Localization in the Motor Cortex
Dr. Clinton N. Woolsey, Charles Sumner Slichter Research Prof. in Neurophysiology, Univ. of Wis. Med. School.

3:00 P.M. Electrical Stimulation of Motor Cortex in Man
Dr. Theodore C. Erickson, Assoc. Prof. of Surgery (Neurosurgery), Univ. of Wis. Med. School.

3:30 P.M. The Treatment of Hyperhydrosis of Iontophoresis
Dr. Harry D. Bouman, Prof. of Phys. Med., Univ. of Wis. Med. School.

There will be no registration fee. Visitors from outside of Wisconsin will be welcome. It is suggested that those wishing to attend this meeting make hotel reservations early.

For advance registration and reservations for dinner and luncheon write: Miss Emma Zitzer, 207 N. Brooks Street, Madison, Wisconsin. Telephone 6-6207.

Index to Current Literature

Apparatus

Reliable Evidence for Acceptance of Devices for Physical Medicine. Howard A. Carter. Arch. Phys. Med., Feb. 1949.

Therapeutic Devices Under the Federal Food, Drug and Cosmetic Act. Irvin Kerlan. Arch. Phys. Med., Feb. 1949.

Circulation

The Effects of Therapeutic Exercise on the Peripheral Circulation of Normal and Paraplegic Individuals. Khalil G. Wakim, Earl C. Elkins, Ralph E. Worden, and Howard F. Polley. Arch. Phys. Med., Feb. 1949.

Geriatrics

Physical Medicine in Disabilities of the Aged. Harold Dinken. Arch. Phys. Med., Feb. 1949.

Geriatric Rehabilitation. Trevor H. Howell. Occup. Therapy and Rehab., December 1948.

Heat and Cold

The Use of a Cold Room in Treatment of Hyperprexia and Burns. Herbert R. Brown, Jr., and Vincent De Lalla, Jr. Arch. Phys. Med., 1949.

Miscellaneous

Some Metabolic Observations During and After Exercise in Patients Convalescing from Acute Illnesses. Robert C. Darling. Arch. Phys. Med., Feb. 1949.

A Physical Medicine Rehabilitation Hospital. Robert W. Boyle. Arch. Phys. Med., Feb. 1949.

Electrophysiological Methodology for Studies in Neuropharmacology. A. Mauro, A. P. Truant, and E. L. McCawley. In Yale Journal of Biology and Med., December 1948.

Relation of Pain Sensory Threshold to Form of Mechanical Stimulator. George H. Bishop. J. Neurophysiology, January 1949.

Peripheral Nerve Injuries

Regeneration of Peripheral Nerves. Frederick Hiller. Quarterly Bull. of Northwestern Univ. Med. School, Spring Quarter 1949.

Modern History of Peripheral Nerve Surgery: World War II and the Postwar Study of Peripheral Nerve Regeneration. Barnes Woodhall. J.A.M.A., Feb. 26, 1949.

Posture

Posture Insurance for Infants and Children. Mabel L. Fitzhugh. Public Health Nursing, February 1949.

Ultraviolet Radiation

Evaluation of Ultraviolet Radiation of Sleeping Quarters as Supplement of Accepted Methods of Disease Control. Amer. J. Hygiene, September 1948.

Coming Meetings

Date	*Organization*	*Place*
May 18-21	Association for Physical and Mental Rehabilitation	Hotel New Yorker, New York, N. Y.
June 19-23	American Physical Therapy Association	Copley Plaza Hotel, Boston, Mass.
Aug. 23-27	American Occupational Therapy Association	Book-Cadillac Hotel, Detroit, Mich.

Abstracts

John S. Coulter, M.D.

Poliomyelitis: Effect of Exertion During the Preparalytic Stage

E. R. Hargreaves, M.D., D.P.H., Deputy M.O.H., Cornwall County Council. In BRITISH MEDICAL JOURNAL, No. 4588, p. 1021, December 11, 1948.

A history of great physical exertion immediately preceding the onset of severe paralysis in attacks of poliomyelitis has often been recorded, but until recently no statistical evidence was available to determine whether such instances were more frequent than chance would dictate.

The effect of physical or mental exertion during the preparalytic stage of poliomyelitis on the ultimate prognosis is analyzed in thirty cases of the disease which occurred in Cornwall during 1947-48.

The findings support those of Russell (1947)—namely, that severe physical activity during the preparalytic stage is associated with grave prognosis. Severe mental strain, such as driving a car over long distances, appears to be equally disastrous, whereas paralysis tends to be mild in cases confined to bed during the preparalytic stage.

A Study of Fasciculations

Harry A. Teitelbaum, M.D., Ph.D., and H. Waldo Bird, M.D. In THE JOURNAL OF NERVOUS AND MENTAL DISEASE, 108:6:455, December 1948.

The well-intrenched concept that fibrillations and fasciculations have their origin in anterior horn cells that are undergoing an irritative degeneration has not withstood the onslaught of recent investigation very well. From the studies of Langley and Kato (1914-15) it became evident that fibrillations occur spontaneously in muscle on the fourth or fifth day following section of the nerve supply. Denny-Brown and Pennybacker (1938) confirmed the above and suggested that these fine, rhythmical twitches could be due to sensitization of the denervated muscle fibers to the normal acetylcholine content of the circulation. These authors proposed that these fine movements be designated as fibrillations in contradistinction to the coarser types seen clinically and to which they refer as fasciculations. Tower (1939), however, is not certain that this distinction is justified. And more recently, Forster, Borkowski and Alpers (1946) have concluded that "fasciculations and fibrillations probably represent the same phenomenon, the only difference being that fasciculations are synchronized fibrillations occurring in the same motor unit." In this paper the term "fasciculation" will be used in a broad sense, referring to all muscle twitches recorded in the electromyogram.

The incident of fasciculations in cases of progressive muscular atrophy, triorthocresyl phosphate poisoning and diffuse encephalomyelopathy of a nonspecific nature has been studied. Spinal anesthesia and peripheral nerve block had no effect on the fasciculations in the cases of progressive muscular atrophy and in those of encephalomyelopathy; but in the case of triorthocresyl phosphate poisoning, spinal anethesia had a striking inhibitory effect. Intocostrin successfully abolished the fasciculations present in the three types of cases, while prostigmine increased the fasciculations in the two cases of progressive muscular atrophy. The observations reported are integrated with the findings of previous investigators in this field, and the possible mechanisms by means of which several specific drugs act are elaborated on to some degree. All of the data are employed in an effort to elucidate the problem of the site or sites of origin of fasciculations.

The Control of Circulation Stasis by the Electrical Stimulation of Large Muscle Groups

Frank L. Apperly, M.D., D.Sc., F.R.C.P., and M. Katharine Cary, A.B., Instructor in Pathology, Richmond, Virginia. In THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 216:4:919:403, October 1948.

The various causes of circulatory failure include loss of blood volume, failure of cardiac, muscle or respiratory pumps and the loss of vascular tonus. Although a vast amount has been written concerning most of these, it is only in recent years that we have begun to appreciate the role of the muscle pump, particularly as regards stagnation of blood in the lower limbs and the relation of this condition to postoperative shock and thrombosis with pulmonary embolism.

A simple method of aborting or preventing the peripheral circulatory failure of gravity shock has been described. The method is now being applied in this hospital: (a) in the treatment of traumatic shock, and (b) as a preventive of postoperative shock, venous stasis and thrombosis. To date, some 60 patients have been treated, but these numbers are too small to warrant conclusions. It is hoped, however, that the method will be tried and reported in other hospitals.

Current Therapeutic Procedures in Coronary Disease

William S. Middleton, M.D., Madison, Wisconsin. In ROCKY MOUNTAIN MEDICAL JOURNAL, 46:1:27, January 1949.

With the warning of the symptoms and signs of coronary insufficiency frank coronary thrombosis may be postponed or averted. On the other hand this accident in all of its classical features may occur without premonitory signals of distress. Conversely the atypical and silent forms may baffle the most astute diagnostician. The therapeutic targets are specific, namely, control of pain and hypoxia, sedation, protection of the myocardium, improvement of the coronary blood flow, prevention of embolism and of propagation of the thrombus, preservation or restoration of normal conduction and maintenance of minute volume output of the heart (control of cardiac decompensation). Absolute bed rest, with mental as well as physical relaxation, is the first indication in the treatment of acute coronary occlusion.

The convalescence from a coronary accident frequently is tedious. Recognizing every grade of myocardial handicap, minor episodes admittedly escape notice or progress to an uneventful convalescence without unusual protection. On the other hand, serious degrees of disability to fatality may succeed initially inconsequential manifestations. The prognosis of coronary thrombosis is beset by many pitfalls. Accordingly conservatism is the best policy. Physical rest in bed must be enjoined for six weeks in the average subject. Compromises in the reduction of this period may be made in the victims of lesser attacks under carefully controlled conditions. Conversely, a certain number with severe reactions must remain in bed for several months to insure the establishment of a maximal collateral circulation and myocardial reserve. Physical inactivity can be carried to inordinate extremes. The period of recuperation may be reached when carefully graduated exercise becomes the key to more adequate myocardial recovery. Mental rest likewise must be insured.

The Effect of Microwave Diathermy on the Peripheral Circulation and on Tissue Temperature in Man

Jerome W. Gersten, M.D., Khalil G. Wakim, M.D., Ph.D., J. F. Herrick, Ph.D., and Frank H. Krusen, M.D., Rochester, Minn. In ARCHIVES OF PHYSICAL MEDICINE, 30:1:7, January 1949.

Two hundred and fifty-four observations were made on 50 normal human subjects concerning the effects of microwave radiations (2,450 megacycles per second) on the peripheral circulation and on the temperature of skin, subcutaneous tissue and muscle. The director used was hemispherical and about 9 cm. in diameter and was 5 cm. from the skin during the period of exposure. The output used was 60 or 80 watts, and the duration of exposure varied from one to thirty minutes. The following observations could be made:

(1) Significant increases of blood flow and of tissue temperature in the exposed extremity resulted with both outputs and all durations used. There were minimal general effects and no ill effects.

(2) The greatest amount of energy absorbed was, on the average, in the muscle.

(3) After absorption of energy reached a certain point, the increase of blood flow was sufficient to remove heat at a greater rate than it was accumulating, resulting in a fall of tissue temperature from the peak reached at twenty minutes of exposure. The greater the increase of circulation, the greater the decrease of the temperature of exposed tissues from the maximal values reached. After thirty minutes of exposure significantly greater increases of blood flow resulted from 80 watt exposure than from 60 watt exposure.

(4) The curve relating increase of blood flow to duration of exposure at 80 watts is S shaped and indicates an early phase of acceleration of the increase of blood flow, followed by a phase of retardation.

Recent Advances in Research and Treatment of Multiple Sclerosis

I. Mark Scheinker, M.D. In THE OHIO STATE MEDICAL JOURNAL, 45:1:27, January 1949.

Multiple sclerosis was considered by its first describers, of almost a century past, as something of a curiosity. With advancement in knowledge of the disease and with progressive refinements in diagnosis, it is recognized today as one of the commonest among neurologic diseases.

Three new avenues of research, crystallized during the last decade, are briefly summarized.

A clinical study of a series of 40 cases of multiple sclerosis yielded the following observations:

1. The large majority of cases of multiple sclerosis show a marked degree of arterial hypotension. Repeated measurements yielded systolic and diastolic pressures far below normal values.

2. A striking myasthenia-like fatigability of the skeletal muscles is an extremely frequent complaint of most patients. Almost without exception, they seem to have some degree of muscle power in the early morning hours, becoming increasingly weak and tired throughout the remainder of the day. The rapid loss of muscle power may, in some cases, be easily recovered after a short period of rest. Difficulties in walking, speech disturbance, tremor and locomotor ataxia, as well as difficulties in swallowing, become more pronounced in the afternoon and evening hours.

3. A striking influence of morale and emotional factors upon the extent and severity of symptoms is evident. A large proportion of cases of multiple sclerosis are in a permanent state of anxiety and tension, and show a dire need for help and guidance. The initial success of any "new" treatment applied to patients afflicted with multiple sclerosis is based primarily upon this craving for guidance and a marked susceptibility to suggestive psychotherapy.

On the other hand, there is a striking correlation between emotional instability and the severity of a given symptom or symptoms.

All these clinico-pathologic observations were taken into consideration in formulating the procedure of treatment. The therapeutic measures advocated may be divided into:

(1) Those founded upon the author's theory of the pathogenesis of the disease. They are aimed at elevation of blood pressure and stimulation of circulation for the purpose of counteracting the vasoparalytic vascular phenomena which result in stasis and thrombosis of some of the small cerebral veins and capillaries.

(2) Therapeutic measures aimed at alleviating the myasthenia-like fatigability and muscle weakness. Excellent results have been obtained in a number of cases with generous administration of prostigmin.

Supplementing the generous use of prostigmin, there are prescribed daily muscle exercises as a part of a broad plan of muscular reeducation and rehabilitation. A large series of muscle exercises were developed, and these are prescribed individually, depending upon the disabilities of each patient. They have proved effective in a number of cases in the restoration of muscle power and in facilitating recovery in function of the weakened limbs. Needless to say, while patients with less pronounced weakness have revealed relatively rapid beneficial results and considerable improvement, the response in patients with severe and longstanding paralysis has been much slower and less satisfactory.

I know that some of these measures will shock those who still believe that the best thing to do for a patient afflicted with multiple sclerosis is to give him as much bed rest as possible.

In my own experience this unfortunately popular regime serves to accelerate the weakness, spasticity and uselessness of the involved muscles, and at the same time has a disastrous effect upon the morale of a patient who feels abandoned and deprived of any hope of active help.

(3) Finally, but not least, a series of therapeutic measures that may be summarized under the heading of "morale building."

Like any other serious personal problem, multiple sclerosis should be presented to the patient as a not-hopeless challenge requiring active cooperation with the physician.

Some Manifestations of Reflex Activity in Spinal Man With Particular Reference to the Occurrence of Extensor Spasm

Robert A. Kuhn and Martin B. Macht. In BULLETIN OF THE JOHNS HOPKINS HOSPITAL, 84:1:43, January 1949.

(1) The involuntary activity patterns of skeletal muscles innervated below the level of lesion in 27 verified cases of complete spinal cord transection have been studied. In each instance, examination was possible at least two years after division of the cord had occurred. Observations were made on men who had survived complete transection of the cord for periods of from 24 to 42 months. The levels of transection ranged from D-2 through D-12.

(2) During the periods of observation two patients exhibited flexor spasms alone; two showed approximately equal flexor and extensor spasms and eighteen displayed predominant extensor spasms. Five patients were completely flaccid below the level of lesion.

(3) The most typical progression of reflex activity following spinal cord transection in this series of patients was:

A. Spinal shock.
B. Minimal reflex activity.
C. Flexor spasms.
D. Alternating flexor and extensor spasms.
E. Predominant extensor spasms.

The length of time that different subjects remain in a given stage varies considerably. In general, stage A lasts for one to six weeks; stages B and C, six weeks to one year; stage D rarely begins prior to four months after injury and usually is terminated within one year, and stage E may appear as early as six months post-injury and may continue indefinitely.

(4) Extensor thrust is not a common finding but can be elicited occasionally in spinal man.

(5) "Spinal standing," similar to that seen in animals with transected cords, can occur in spinal man.

(6) Sustained patellar and ankle clonus frequently occurs in chronic spinal man.

(7) Primary extensor manifestations in chronic spinal man probably represent the reappearance of primitive and poorly integrated postural activity mediated by the isolated cord. It would appear that the functional capacity of the isolated human spinal cord is greater than has been assumed.

(8) It is concluded that, although spinal man passes through a period in which flexion reflexes alone are active, he frequently may progress to a stage of activity characterized by predominantly extensor reflexes, amounting in many cases to extensor spasm.

(9) Extensor spasm in skeletal muscles, innervated below the level of transection, is not conclusive proof of an incomplete division of the human spinal cord.

(10) It is probable that many of the discrepancies between these observations and those of earlier investigators can be explained by the increased duration of life and, secondarily, by the better physical condition of present-day spinal men.

Our Common Problem

Basil O'Connor. In THE CRIPPLED CHILD, 26:4:4, December 1948.

The problems of the National Society for Crippled Children and Adults are closely related to those which we have in the National Foundation for Infantile Paralysis. Our interest in your plans is deep-rooted, born of long association with your great organization and its vital service to the physically handicapped. Through the years your member societies have worked side by side with chapters of the National Foundation for Infantile Paralysis. The existence of our organizations represents a bulwark of hope for the crippled of this nation and a demonstration of the result that can be obtained when the interest of the public is directed to the accomplishment of specific ends.

The voluntary health movement in this country has been a tremendous force in conquering public apathy toward health and social welfare work. The nation today is unquestionably more health-conscious than ever before, more alert to its responsibility to the sick, the disabled and the underprivileged.

And yet despite the good we have accomplished there are those who sometimes, I feel, are so interested only in the mechanics of this kind of activity that they demand that national private health and welfare services be merged into one collection agency, to eliminate, as they say, the "annoyance" of multiple requests for contributions. The voluntary health movement itself in this country, as we know it, could have originated only in the United States of America where freedom of action and aggressiveness are characteristic of our people. It is reasonable to believe that if governmental controls and restrictions had existed to hamper, to any serious degree, this aggressive attitude and freedom of inquiry there could never have been a voluntary health movement such as exists in this country today, nor would there have been the dynamic advance in the treatment and prevention of any diseases which are no longer critical illnesses in this country, because we have rol'ed up our sleeves and gone to work on them with the industry and enthusiasm of a free people.

If the health and welfare activities of this country are to be merged and controlled by one entity—that entity must necessarily, of course, be the government since none would deny that the health and welfare of our people is primarily in the public domain. No one wants that and yet the attempt to merge and combine such activities through one organization will lead quickly to that very result—total governmental operation and control of all health and welfare activities. I repeat—the American people do not want that. Even government does not want that! None of us would wish to see what might be called a supermonopolistic mechanical collection agency. We do not like monopoly in this country. And no one wants this less than those fine people who have been misled into supporting this movement.

These are times when we must build. We will gladly argue with any man the merit of his constructive ideas but we have no time for those who seek to strengthen their own cause by unjustly tearing down the work of others.

Let us, by no means, lose sight of our obligation to those who are contributing the funds that sustain the nation's various health projects. But then, also, let us not minimize the much greater importance of our work to those who benefit from it. Therein lies the true significance of every problem that may arise in connection with voluntary health agencies—they must be solved from the viewpoint of those who urgently need our assistance.

It is up to each voluntary health and welfare agency to justify its existence by real service to the public in its chosen field. If this service is necessary and efficient, and if the public is properly acquainted with the need for such service, you may depend upon the American people to support the responsible agency wholeheartedly, generously and continuously.

The American people, given sufficient facts to think this question through, will agree that organizations which appeal for funds must have freedom to make a direct appeal to them. These efforts are the symbol of the generosity of the American people which has long been an example to the world. If campaigns for the betterment of mankind were to cease, it would be a sign that the principles on which our democracy was based no longer exist. If compulsory joint fund-raising were pushed to the point of financing all national agencies, it would be difficult to distinguish the results from the process of taxation. When taxes take the place of free-will giving that is based on individual choice, one responsibility that is the basic element in our way of life will have been lost.

There always will be tremendous problems in the wide and varied field of health and welfare. As we solve those of the moment, others will rise to take their places. It is our job to work realistically and aggressively to meet the changing situation and to keep pace with the times.

The Broadening Horizons of Rehabilitation and Physical Medicine

Howard A. Rusk, M.D. In ARCHIVES OF PHYSICAL MEDICINE, 30:1:26, January 1949.

One of the first schools to teach rehabilitation and physical medicine as the "third phase of medicine," is New York University, where a Department of Rehabilitation and Physical Medicine has been in existence for two years as a major department of the college. Major activities of the department are training, research and patient care, through the use of the teaching facilities of the College of Medicine, the rehabilitation and physical medicine service at Bellevue Hospital, and the Institute of Rehabilitation and Physical Medicine of the New York University-Bellevue Medical Center.

Electric Stimulation of Denervated Muscle

Bernard Stoll, M.D., New York. In ARCHIVES OF PHYSICAL MEDICINE, 30:1:41, January 1949.

1. The following favorable effects can be expected from electric stimulation: a heavier, larger, and less fatiguable muscle which contracts more briskly; a muscle more nearly normal from the point of glycogen, creatine, phosphocreatine, myocin, protein, collagen, and water content; and a muscle more normal in macroscopic and histologic appearance. In short, a muscle which requires much less recovery to return it to its normal state.

2. To consistently duplicate such results treatment may be short, but it should be started early and administered frequently. It is necessary to develop maximum tension. To attain this end a tetanus is required, and it is necessary to restrain muscle shortening during contraction.

3. The significance of changes in the Schwann tubes and in the muscle during prolonged periods of denervation has been considered.

4. The need for filling certain gaps in our knowledge before a full evaluation of electric stimulation in the treatment of paralyzed muscle can be made has been pointed out.

The Physiologic Effects of Physical Therapy

George Morris Piersol, M.D., F.A.C.P., Philadelphia, Penna. In ANNALS OF INTERNAL MEDICINE, 30:1:69, January 1949.

During the past ten years interest in physical medicine has increased markedly. In spite of this physicians continue to show considerable scepticism as to the advantages of this form of therapy. This attitude is due in no small measure to the belief that physical medicine does not rest upon a sound physiological basis. The purpose of the following remarks is to point out that the most useful and commonly employed procedures in physical medicine, i.e., the use of various forms of heat and cold, massage and therapeutic exercise, depend for their effectiveness upon well established physiological reactions. A thorough understanding of these reactions is as essential to the successful use of physical therapy as is correct diagnosis, accurate anatomic knowledge of the involved part, and familiarity with various technics.

Heat

Heat, in some form, applied generally or locally, represents the therapeutic measure most frequently used in any department of physical medicine. A summary of one year's experience in a general hospital showed that of 23,345 treatments given in the department of physical medicine heat was a feature in 44.3 per cent of cases. Next to heat came massage, 34 per cent, and then therapeutic exercise, 15.4 per cent. The value of heat in the management of many conditions, based upon clinical observation, appears to be well established. In spite of the widespread employment of heat as a therapeutic agent and extensive physiological studies on the effects of heating, the complex changes that are induced when human beings are subjected to heat are still imperfectly understood.

Observations recently carried out by Horvath and Botelho at the University of Pennsylvania furnish data on some physiological reactions that are brought about when individuals are placed under the abnormal stress of heat, regardless of whether it is used in its positive aspect, as a hot bath, or in its negative aspect, as a cold bath.

In the course of a discussion of the physiological effects of heat Horvath states that two factors always must be considered in heat therapy: (1) the amount of heat successfully applied into the tissues, and (2) the extra amount of heat produced in the tissue as a consequence of the oxidation processes that have been accelerated by the heat applied. These factors deserve careful consideration when heat therapy is contemplated.

Mechanotherapy

Under mechanotherapy are included massage, therapeutic manipulation and all kinds of exercise. In spite of careful studies that have been carried out by such investigators as Pemberton, Coulter, Mennell, and others, much remains to be done to bring about a complete understanding of the physiological effects of massage.

Massage stimulates the contraction of both voluntary and involuntary muscles. Various reflex phenomena result from the stimulation of sensory receptors in the skin as well as in the deeper nerve trunks. With the application of external pressure it is possible to displace the contents of hollow viscera and of accessible glands and their ducts. Collections of inflammatory exudate in skin and muscles may be dissipated by massage. As pointed out by Scull, massage involves the application of the stimulus of pressure to tissues. It has been shown that in normal subjects massage has no significant effect on pulse rate, blood pressure or oxygen consumption.

Therapeutic Exercise

The interest of the physiatrist centers chiefly about corrective exercise, which has been defined as the scientific application of bodily movements in the treatment of disease or malfunction. The subject has attained increasing importance of late because of the prominent role which remedial exercise plays in the extensive reconditioning programs now established by various agencies throughout the country. Therapeutic exercise has as its primary purpose not so much the development of muscle power but rather the acquisition of ability to use muscles effectively in carrying out essential acts and skills.

In spite of the enormous amount of work that has been devoted to the changes incident to muscular contraction, there still is considerable divergence of opinion among competent students of the subject.

The physiological fact that the redevelopment of muscle power, even in markedly atrophied muscles, depends upon high resistive, low repetition exercises led DeLorme to devise a system of heavy resistive exercises. For this purpose he has designed a series of weights which can be attached to various parts of the body so that they can be lifted by voluntary muscular effort. According to his program, one day each week the patient exerts maximal power to lift a suitable weight once. On the other days he lifts a weight which is no heavier than that which is maximum for ten repetitions. Striking results in improved muscle power have been obtained by this procedure.

Hellebrandt and her associates confirmed an older observation that unilateral heavy resistive exercise not only increases the strength of the exercised limb but brings about a similar concomitant effect on the contralateral unexercised limb. They found that the determining factor in this so-called cross education was the amount of effort expended rather than the duration of the exercise. This cross education may prove a useful therapeutic tool in cases in which voluntary control is unilaterally defective or in which contralateral muscle groups are temporarily inaccessible because of immobilization.

Physical Medicine Residencies for Army Interns

In THE BULLETIN OF THE U. S. ARMY MEDICAL DEPARTMENT, 9:1:34, January 1949.

The Surgeon General announces the availability of a limited number of positions for assistant residents in physical medicine at three of the Army teaching hospitals—Letterman General Hospital, Walter Reed General Hospital, and Fitzsimons General Hospital. These will be held open for a

limited period for interns now on duty in Army hospitals who desire to enter this field on completion of their internships. The residencies have been approved by the American Board of Physical Medicine and the Council on Medical Education and Hospitals of the American Medical Association. In addition to the three years of formal residency training required by the Board, there is provided the opportunity for clinical training in the diagnosis and treatment of disease by physical means. This includes the technics of rehabilitation of the physically disabled. In the second or third year of training the resident will be expected to conduct a research project in some phase of the field. Those interested in such a residency should communicate immediately with the Chief, Physical Medicine Consultants Division, Surgeon General's Office, or discuss the subject with the chief of the physical medicine service in their particular hospital.

Anterior Poliomyelitis: Early and Late Electrical Stimulation of the Muscles

Stafford L. Osborne, Ph.D., A. J. Kosman, Ph.D., H. D. Bouman, M.D., Robert T. McElvenny, M.D., and A. C. Ivy, Ph.D., M.D., Chicago, Illinois. In SURGERY, GYNECOLOGY AND OBSTETRICS, 88:2:243, February 1949.

Sachs in 1910 wrote that the aim of therapy for the patient with anterior poliomyelitis should be to exercise muscles which cannot be exercised voluntarily. For this, he recommended the use of a form of electrical current which would yield the best contraction with a current of moderate strength. Williams and Levick concurred and maintained that the treatment should be applied early after the diagnosis of the disease.

The present article represents the application of our observations on animals to patients with anterior poliomyelitis. The results on patients with a muscle denervated by section of a nerve will be reported later.

1. A new type of generator was used in this study. The generator supplied a pure sinusoidal current which could be varied at will from two to six thousand cycles per minute.

2. The maximum contraction and tension can be secured in paralyzed muscle with a minimum current intensity when consideration is given to both current form and current frequency.

3. Children from 2 to 16 years of age and afflicted with anterior poliomyelitis were given vigorous muscle contractions, and tolerated the current well.

4. Electrical stimulation of the muscles was given to 7 patients as soon as the diagnosis of anterior poliomyelitis was made (the "early" group). Thus treatment can be instituted during the acute phase of the disease without injury to the muscles or the patients. It also was given to 13 patients who had the sequelae of the disease from 6 months to 6 years (the "late" group).

5. In both groups of patients the bulk of the muscles stimulated daily was favorably affected. There was a statistically significant increase in size of the treated muscles for the "late group." In the "early group" where the initial limb measurements were taken before much atrophy had occurred, the mass of the treated muscles was definitely maintained.

6. There was some improvement, though not statistically significant, in the strength of the muscles stimulated.

7. Electromyographic evidence in the "late" cases suggests that electrical stimulation may be of value in helping to restore normal innervation patterns of the involved muscles.

8. There was some evidence, though less tangible, that stimulation of the muscles was a distinct aid in helping the patient to gain a sense of muscle action needed, and that this was an aid in the reeducation of the muscle when active exercise was attempted.

9. Treatment should start, according to our results, as soon as the diagnosis of anterior poliomyelitis is assured. However, in selecting muscle for purpose of studying a treatment, 1 or 2 months should elapse after the onset of the disease.

10. The rationale for the use of electrical currents in the stimulation of muscle is discussed.

Return of Sensation After Experimentally Produced Lesions in Sciatic Nerve of Cat

Irving C. Sherman, Eli L. Tigay, Alex J. Arieff, and Maurice A. Schiller, Department of Nervous and Mental Diseases, Northwestern University Medical School, Chicago, Illinois. In JOURNAL OF NEUROPHYSIOLOGY, XII:1:14, January 1949.

The area of analgesia after section of the saphenous major, tibial, peroneal and sural nerves of the cat's leg have been described. The sensory supply of the whole sciatic nerve has been outlined and the extent of the loss was shown in accordance with the sural nerves involved.

The terminology of sensory loss and sensory regeneration is not well defined and it is suggested that some uniformity be accepted. The anatomic sensory supply of a nerve should be considered to be that area represented by the loss of light touch immediately after section of that nerve. The area within the periphery of the anatomic sensory supply has preservation of pain as a result of dual innervation from adjacent nerves and, therefore, this narrow area should be called the area of dual innervation or intermediate zone. When other nerves adjacent to one left intact are severed, the area of preserved sensibility is called the residual supply of the nerve.

When some time has elapsed after section of a nerve and the area of analgesia continues to shrink without regeneration, this shrinkage is due to overlap and is brought about by the ingrowth of fibers from adjacent nerves. In this area there is recovery of deep pin-prick whereas the area of loss of touch remains constant.

Finally, the area which remains completely insensitive to all cutaneous sensations whatever time may have elapsed without regeneration is called the area of isolated supply. Any recovery within this area can result only from regeneration.

We have outlined the area of potential nerve overlap for the sciatic nerve of the cat. As in man, large areas of return of sensibility to pain within the anatomic supply of a nerve occur as the result of overlap when regeneration is impossible. The rate and manner of this return is described.

The rate and the completeness of return of sensibility to pin-prick is described after primary and secondary sutures. The recovery of sensation due to regeneration, as opposed to the return of sensation due to overlap, often is characterized by large areas becoming imperfectly sensitive as contrasted to shrinkage of the area of analgesia.

No correlation was found between the recovery of sensation and of motion. As in man, motor recovery may be well advanced and sensory recovery may not have begun. As in man, pressure pain returned before sensibility to deep pin-prick.

The placing reaction occurred before return of cutaneous sensibility and was related to motor recovery and probably deep sensibility, to which there is a greater overlap than to pain.

When a suture was delayed for 60 days after section of a nerve, recovery of sensation of deep pin-prick was markedly delayed both as to time of first evidence of recovery and completeness of recovery. Moreover, often there were long periods of delay between a certain degree of recovery and a later progression. Furthermore, in a number of cases no sensory recovery occurred.

Heating of Human Tissues by Micro Wave Radiation

Steven M. Horvath, Ph.D., Ruth N. Miller, M.D., and Bruce K. Hutt, P.T., Philadelphia, Pa. In THE AMERICAN JOURNAL MEDICAL SCIENCES, 216:4:919:430, Oct. 1948.

Due to a slow rate of penetration, the heat furnished by most clinical methods of heat therapy is relatively ineffective in raising deep tissue temperatures. Short wave diathermy, the only available procedure for deep and rapid heating, also induces generalized effects and is, therefore, not easily adapted to the heating of localized masses of tissue. Since deep heating is successfully accomplished only through the medium of high frequency electrical energy, numerous attempts have been made to apply for therapeutic purposes the very high frequencies near the infra-red region of the spectrum.

The employment of high frequency electrical energy in the 12 centimeter band (2450 megacycles per second) of the electromagnetic spectrum provided a means of selectively heating local masses of tissue. The magnitude and depth of heating can be modified by varying directors and the power output of the generator. Maximal temperatures observed following a 15 minute period of heating, utilizing a power output of 50 watts and a 6-inch director, were 36.4 C. at the surface, 44 C. at subcutaneous levels, and 40 C. in muscle tissue. In the majority of the experiments the temperature gradient from subcutaneous tissue or muscle to surface was not modified greatly as a consequence of this mode of heating. However, in a large number of instances the subcutaneous to muscle gradient was reversed. High internal temperatures were secured with only incidental elevation of surface temperatures. No increases in rectal temperature were observed.

Poliomyelitis in Families Attacked by the Disease: I. Distribution of Virus in Stool and Oropharynx of Members in Households

Herbert A. Wenner, M.D., Assistant Professor of Pediatrics and Bacteriology, and William A. Tanner, M.D., Resident in Pediatrics, Kansas City, Kansas. In THE AMERICAN JOURNAL MEDICAL SCIENCES, 216:3:918:258, Sept. 1948.

1. A study of 5 families in which poliomyelitis appeared provided evidence of a widespread distribution of virus in members of these households.

2. There were 24 members in these households; 17 had poliomyelitis virus in their intestinal discharges; in 7 virus was detected in the throat.

3. Poliomyelitis virus was detected in stool samples of 13 children and 4 adults. Virus was present in the throat of each of 5 children and 2 adults.

4. On the basis of history of onset of illness and isolation of poliomyelitis virus in members of 4 households it is suggested that virus was seeded in respective members at a common source.

Book Reviews

Physical Education: Interpretations and Objectives. *By Jay B. Nash, Ph.D., Chairman of the Department of Physical Education and Health, School of Education, New York University, New York. Cloth. Price, $3. Pp. 288, with illustrations. A. S. Barnes & Co., Inc., 67 West 44th St., New York 18, 1948.*

This book gives the results of the author's accumulated experiences in a twenty-year period of teaching courses of physical education. The author believes that it is the assumption that all educative subject matter should contribute to a four-level concept of man: man as a functioning organism, man as a skillful organism, man as a thinking organism and man as an emotional organism. This book will be of interest to students majoring in physical education; administrators in public schools, teaching institutions, health educators; recreation leaders; parents and the general public who are caught between two points of view—the value of exercise and its possible dangers.

Managing Your Mind. *By S. H. Kraines, M.D., and E. S. Thetford. Cloth. Price, $2.75. Pp. 374. The Macmillan Company, 60 Fifth Avenue, New York 11, N. Y., 1947.*

This book was originally reviewed several years ago when it was first published. The present form is no different than the original which was published in May 1943. This book simply constitutes a retyping since there are no changes evident.

The book falls pretty well into the usual form of semi-scientific psychological works which are intended to help the individual change his personality. It will appeal to the introspective and perhaps neurotic individual but like all such books will disturb as many people as it helps. It has the common weakness of such books which by their nature must be superficial and hence will be interpreted in accordance with the particularly biased needs of the reader. If one must read the book he will not find it laborious because the authors have been able to deliver their product in an interesting and simple way.

Practical Clinical Psychiatry. *By Edward A. Strecker, M.D., University of Pennsylvania, Franklin G. Ebaugh, M.D., University of Colorado, and Jack R. Ewalt, M.D., University of Texas. Sixth edition. Cloth. Price, $5. Pp. 476, with 35 illustrations. The Blakiston Company, 1012 Walnut Street, Philadelphia 5, Pa., 1947.*

This is the sixth edition of this text book in psychiatry to be published in a period of seven years. This alone is testimony to the fact that it is useful.

The authors cover the whole field of general psychiatry in a concise and clear way. Their approach is generally that of the genetic-dynamic psychobiology of Adolph Meyer. They have wisely refrained from choosing sides and trying to refute other schools of thought. In this manner they have produced a book which can be very instructive for the medical student and general practitioner.

The format of the book is that of the conventional text in psychiatry. The first chapter is a useful discussion of personality development and function which any intelligent student can grasp. It does not require advanced training in dynamic psychology. This is followed by a chapter on methods of examination and the recent classifications of mental disorders. The various psychiatric entities are then discussed as reaction types. One criticism is offered in the section on the treatment of syphilis. The authors mention penicillin but state it is not accepted as a valid form of treatment alone and then dispense with it. Actually in 1947 penicillin was accepted as one of the useful drugs in the treatment of neurosyphilis, e.g., in acute syphilitic meningitis it can be used alone. The later sections deal with the psychoneuroses, psychosomatic medicine and pathologic drinking. Here too the authors have adhered to very simple formulations and have confined themselves almost to symptomatological descriptions of the various categories. This will strike some readers as being quite superficial and rigid but it should prove adequate for students. There is a final chapter on psychopathologic problems of childhood by Leo Kanner.

In general this book is an acceptable contribution to the literature in psychiatry for students. Its value is enhanced by the numerous informative case histories. The clarity of wording and a good bibliography are valuable assets.

Lectures on the Physiology of Exercise. *By Arthur H. Steinhaus, Professor of Physiology, George Williams College, Chicago. Paper. Price, $1. Pp. 23. The Author, George Williams College, Chicago 15, 1948.*

The material in this book is presented under the following chapter headings: The physiological basis of fitness; the anatomy, physiology and development of strength; muscle blood supply as related to muscle function; heart, circulation and respiration in relation to exercise and endurance; tonus, posture, muscle sense, physiologic and psychologic aspects of tension, and the problem of relaxation; and nutrition in physical fitness.

A list of exercises and work items graduated in terms of their work cost or weight reducing value is given. Examples from this list are: "Standing at rest, calories used per hour—27; to work off one pound of body fat—stand for 160 hours. Muller's system of freehand gymnastics: calories used per hour—399; to work off one pound of body fat, drill for 10½ hours." Physical therapists will find this an interesting book.

Meet Our New Contributors

Abramson, David I., 517 S. 8th Ave., Maywood, Illinois. Doctor Abramson received his M.D. degree from Columbia University and Long Island College of Medicine in 1929. He is at present Clinical Assistant Professor of Medicine, University of Illinois College of Medicine; Attending Physician, Hines Veterans Hospital, and Associate Attending Physician, Michael Reese and Mt. Sinai Hospitals, Chicago, Illinois. He is a Diplomate, American Board of Internal Medicine; Fellow, American College of Physicians and Circulation Section of American Heart Association; Member, Central Society of Clinical Research, American Society Clinical Investigation, Chicago Society of Internal Medicine, Society of Experimental Biology and Medicine, Sigma Xi, and Chicago Medical Society.

Newman, Louis B., Veterans Administration Hospital, Hines, Illinois. Doctor Newman received his Mechanical Engineering Degree from the Illinois Institute of Technology, and his M.D. degree from Rush Medical College in 1931. He has served as Associate Professor of Physical Medicine at Northwestern University Medical School, Chicago, Illinois; as Chairman, Midwestern Section, Congress of Physical Medicine; Commander, U. S. Navy; Head, Department of Physical Medicine and Rehabilitation, U. S. Naval Hospitals, Oakland, Calif., and Seattle, Wash., 1942-46. At present he is Chief, Physical Medicine Rehabilitation Service, Veterans Administration Hospital, Hines, Illinois. Member: American Board of Physical Medicine; Fellow, American Medical Association; American Society of Physical Medicine, American Society of Mechanical Engineers; American Congress of Physical Medicine; Society of American Military Engineers; Advisory Board, Association for Physical and Mental Rehabilitation.

Stephens, Hazel Royall, Georgia Warm Springs Foundation, Warm Springs, Georgia. Mrs. Stephens received her B.S. degree from Florida State College for Women in 1935; her M.A. degree from Columbia University, New York City, in 1940; and has her thesis in publication for an M.A. degree in Physical Therapy from Stanford University, Calif. At present she is Director, Remedial Activity, Georgia Warm Springs Foundation. Member: American Physical Therapy Association.

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All reservations will be confirmed. Reservations will be held until 6:00 P.M. unless hotel is notified of late arrival.

Chapter Directory

Alabama Chapter
President, Bernice K. Carr, 325 41st St., Fairfield, Ala.
Secretary, appointment pending.

Arizona Chapter
President, Mrs. Florence Collier, 1902 E. 3rd St., Tucson, Ariz.
Secretary, Leone Crosby, Tucson Senior H. S., 2nd Ave. and 6th St., Tucson, Ariz.

Arkansas Chapter
President, Gladys E. Post, Rivercliff Apts., Magnolia St., Little Rock, Ark.
Secretary, Geraldine Larson, 1406 Lincoln Ave., Little Rock, Ark.

Carolina Chapter
President, Emily Cate, 1622 Heyward St., Columbia, S. C.
Secretary, Lelia R. Zernow, Box 606, Black Mountain, N. C.

Central New York Chapter
President, John Lindell, 1652 Grandview Ave., Utica 4, N. Y.
Secretary, Elvira Hoffmire, 332 Primrose Ave., Syracuse 5, N. Y.

Colorado Chapter
President, Mrs. Angela Keifer, Apt. 17, 3514 S. Broadway, Englewood, Colo.
Secretary, Adeline Doing, Colorado General Hosp., Denver, Colo.

Connecticut Chapter
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Secretary, Sarah C. Johnson, Norton Rd., Kensington, Conn.

Delaware Chapter
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Secretary, Mary L. McCarthy, Box 172, Dover, Del.

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Eastern Michigan Chapter
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Secretary, Sophia Radlow, 2975 Chicago Blvd., Apt. 215, Detroit 6, Mich.

Eastern Missouri Chapter
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Eastern New York Chapter
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Secretary, Kate Birdsall, 186 Lancaster St., Albany, N. Y.

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Secretary, Mrs. Pearl B. Brockman, 314 29th St. S., St. Petersburg, Fla.

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Secretary, Betty Brown, Warm Springs Foundation, Warm Springs, Ga.

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Secretary, Nancy Nevin, 2030 West 39th St., Kansas City 3, Kans.

Kentucky Chapter
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Secretary, Mrs. Agnes Shehan, 3331 Alford Ave., Louisville 12, Ky.

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Acting President, Helen H. Chatelain, P. T. Dept., Charity Hosp. of Louisiana, New Orleans 12, La.
Secretary, Margie Boyd, 514 Park Blvd., Algiers, La.

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Secretary, appointment pending.

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